OCT 14 '22

BULLETIN OF THE

TAYLOR SOCIETY

A SOCIETY TO PROMOTE THE SCIENCE AND THE
ART OF ADMINISTRATION AND OF MANAGEMENT

Are Repair Men, Shipping Clerks and Stenographers Productive Workers?—p. 172

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OCT
1922

Engineering Societies Building
29 W. Thirty-Ninth St.
New York

OCTOBER, 1922 VOL. VII., NO. 5

TAYLOR SOCIETY

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TAYLOR SOCIETY
A SOCIETY TO PROMOTE THE SCIENCE AND THE ART OF ADMINISTRATION AND OF MANAGEMENT
Published by the Taylor Society at
Engineering Societies Building
29 West Thirty-ninth St.
New York

Copyrighted 1922, by the Taylor Society. Published every other month. Per Year to Members $2.50; to others $3.00. This Issue $.75

Entered as second-class matter, Dec. 17, 1921, at the Post Office at New York, N. Y., under the Act of March 3, 1879.

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COMMENT

WE consider the article in this issue by Mr. H. Feldman on "The New Emphasis in the Problem of Reducing Unemployment" the most satisfactory brief analysis of the unemployment problem we have seen. We could not well appraise it differently, for it is the first clean-cut statement of a point of view that coincides with the point of view which this Society has maintained during the ten years of its existence. The Taylor Society, in order to assure itself that it should never become narrow, and in order to possess the demonstrated valuable element in every new point of view, has always been generous in affording a forum for the presentation and consideration of progressive ideas concerning the industrial problem; but it should never be forgotten that year in and year out the Society has maintained that the point of attack on practically every phase of the industrial problem is in the individual plant, and that better industrial conditions in general are to be achieved by wiser administrations and more scientific managements of individual enterprises.

ELSEWHERE in this issue is an editorial on Producers and Non-Producers. It is a general reply to a specific inquiry from a member of the Society, an operating executive. The question raised is of such basic importance that it was believed that the letter of inquiry and the reply should be made available in editorial form to all our readers. The incident suggests the possible development of a new and important feature of the BULLETIN—provided members write a sufficient number of letters of inquiry concerning fundamentals of administration and management, and provided competent persons can be found to prepare the replies. If members will assume the former obligation we shall attempt to assume the latter.

WHY is the inquiry of such fundamental importance? Because the quality of management an enterprise will develop is sure to be determined in large measure by the understanding held by directors, executives and workers of what kind of work is productive and what kind is not. If false assumptions concerning the nature of productivity are held by those who are in a position to determine the kind of management an enterprise is to have, then the resultant kind of management will be correspondingly ineffective. If an executive assumes, for instance, that indirect labor is non-productive, he will not, if he can help it, utilize indirect labor in his operations; but in that case, if indirect labor should in fact be highly productive, he would be losing the advantage of important elements in his operations, and would be inefficient in his management.

IT seems to be a common assumption of executives that direct labor only is productive, that indirect labor is a non-productive expense. We can think of no assumption which is more likely to lead a manager astray in his effort to develop the best management—in fact, in view of the uniformity of productivity of direct labor in competitive industries, the superiority of the management of an individual enterprise is likely to be in proportion to its utilization of *productive indirect* labor. *There* lie the principal resources for more efficient management of which relatively few have taken advantage. Taylor was one of the first to draw heavily upon those resources; yet he was confused in his identification of indirect with non-productive. In "Shop Management" (p. 122) he wrote: "No manager need feel alarmed then when he sees the number of non-producers increasing in proportion to producers, providing the non-producers are busy all of their time, and providing, of course, that in each case they are doing efficient work." What he meant to say in these sentences (and what he practiced) was: "No manager need feel alarmed then when he sees the number of indirect workers increasing in proportion to direct workers, providing the indirect workers are productive." Their productivity can be determined only by measurement of their contribution.

IN these days of large scale industry, specialization among enterprises and specialization and division of labor within an enterprise, it is not difficult to determine what labor is direct and what is indirect, for that is largely an arbitrary classification; but it is not easy to determine what labor is productive and what is not, for that depends upon actual results, and these, for a given kind of labor, may be different under different circumstances. The mechanism for measuring results—chiefly cost accounting and statistics—is so inadequate that in many instances it is not really demonstrable that a given application of labor is or is not productive. It should be borne in mind that an industrial or commercial enterprise aims to satisfy a consumer's want through a commodity or service which is demanded by the consumer, and that the cycle of productive efforts includes everything essential to that purpose, from the first step of the manager in ascertaining the demand and deciding to satisfy it until the commodity or service is delivered and the payment received. Every act within that range *essential* to consummation of the purpose is in general productive, from the point of view of the consumer and the manager, and in particular is productive in proportion as it is efficient and not wasteful of energy. Many of these acts, such as analyzing demand, scheduling processing and sales, planning and supervising operations, keeping cost and progress accounts, correspondence, packing and shipping, providing adequate light, heat and ventilation, oiling machinery, tote service, messenger service, and a score of others, are highly indirect, but they may be essential parts of the cycle and highly productive.

THE various industries present different combinations of acts in their different production cycles—for instance, one combination for the fabrication and sale of shoes, another for the fabrication and sale of automobiles, another for retail merchandising, another for banking, another for transportation. A given kind of application of labor may be productive in one of these combinations and not in another. That makes the problem of the executive who would develop for his particular enterprise the highest type of management, one of determining the particular combination of acts for his enterprise which *in combination* will be most productive. Some of these will be obvious to him—lathe and grinding operations are obviously essential in a machine shop, and press work in a printing establishment. But there are a great many possible acts which are not so obvious. The productivity and desirability of these the executive must determine by investigation and experiment. He must experiment with them in combination, and he must have a dependable instrument for measuring their separate productive contributions in combination—adequate cost accounting. And above all he must approach the problem with an open mind, without such false assumptions as the belief that an indirect application of labor effort is *per se* non-productive, and a direct application of labor effort is *per se* productive.

WE knew many years ago a boy who spent hours in the shop of an old-school, skilled cabinet maker. (We spoiled a skilled bench worker when we later became an indifferent publicist!) What beautiful cabinet work we saw take form in that little shop! The range of acts performed by that cabinet maker was great; we went with him to the lumber yard to select prime mahogany, walnut and white pine; we helped mix and heat his glue; we watched him sharpen his tools; we helped him saw stock to rough dimensions; we did a lot of sand-papering—and so on. Now every one of those acts was considered productive, because directly concerned with the physical handling of materials. Later that same cabinet maker was employed by a big manufacturer. He did but one thing—applied his skill at the bench. Lumber was ordered by a general office clerk on specification; glue was brought ready-prepared to the bench; tools were sharpened by a specialist. These "auxiliary" operations in the plant were looked upon as non-productive—an undesirable expense—because they were indirect. Will those among our readers who are still possessed by the idea that indirect acts are *per se* non-productive, please explain how the procuring of stock when ordered by a clerk in the plant became a non-productive operation, when it had been a productive operation of the skilled cabinet maker who personally went to the lumber yard to order it?

STOP-WATCH DEPENDABILITY

IN the September issue of *Industrial Management* (p. 173) is an article by Adolf A. Hamburger entitled "Verification of Merrick's[1] Formula for 'Allowed Time'" which is of more than passing interest.

Mr. Hamburger's studies were made for the purpose of establishing piecework rates in the cloth-cutting department of a union shop. "The most difficult part of the task was to obtain a curve showing what percentage allowance was to be added to the time taken on the operations in order to arrive at a proper 'allowed time.' We are frankly skeptical to the claim that Merrick's chart would be of any assistance to us in computing the percentage to be added as our kinds of jobs were so different from his. We, therefore, absolutely disregarded it in constructing our curve. In finding an algebraic expression for it, however, the one representing Mr. Merrick's was followed when it was seen that the two curves had the same contour . . . The (slight) difference is no doubt due to the fact that our observations were made in a textile rather than a metal-working industry and so the item of fatigue was not as important. Except for this the curves are so much alike that the difference may quite possibly be due to the inaccuracies of making and interpreting time studies."

Mr. Hamburger's article is illustrated by a cut in which the two curves are plotted upon the same field. At many points they coincide absolutely, and at the points of divergence the difference is so slight as to give the effect of a double hair line.

It is interesting to note that, notwithstanding minor inaccuracies of time study, these independent studies, one in the textile and one in metal-working industries, should have resulted in practically identical allowance-time curves. The Merrick curves represent "thousands of carefully-taken production studies carefully and systematically recorded and analyzed," and apparently present generally usable ratios between the total operation time, handling time, machine time and fatigue allowance.

STOP-WATCH BUNCOMBE

THE usefulness of the stop watch as an instrument of investigation has been amply demonstrated, and its position as a mechanical aid is as secure as is that of the engineer's slide rule, the chemist's retort or the electrician's ammeter.

Who would expect dependable results from a slide rule in the hands of a person who knows nothing of mathematics or the principles of engineering; or from a retort in the hands of one who knows nothing about chemistry; or from an ammeter in the hands of one who knows nothing about electricity?

And why should one expect dependable results from a stop watch or any other time-measuring device in the hands of one inexperienced in mechanical operations and in the conditions surrounding mechanical operations? Yet some merchandisers of stop watches are advertising their wares as though any one is competent to use a stop watch. They seem to offer the stop watch as a substitute for brains, science and experience.

A stop watch has about the same relation to a set of standard times and rates as a slide rule has to the construction of a Woolworth building. The slide rule is a useful mechanical device in computing the formula for the specifications of the building, but the specifications are the product primarily of the application of engineering science, experience and sound judgments. The stop watch is a useful mechanical device in securing the data from which standard times and rates may be derived, but the times and rates are primarily the product of the application of mechanical and other sciences, experience in machine and manual operations, and sound judgments.

The stop watch is not a substitute for science, experience and good judgment.

Time study involves a great deal more than making observations. "The preliminary step of explaining the purpose and methods of time study, and winning confidence and cooperation; the primary step of establishing standardization of equipment and methods and developing a smooth flow of work through a department; the detail steps of studying every machine and determining the correct method of manipulating and operating each; the prompt and accurate sizing up of operators with respect to their individual abilities and skills; the analysis and interpretation of time-study observations and the computation of usable times and rates; these are the important phases of time-study work, and *these demand professional experience and judgment.*"

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[1] Cf. Merrick, "Time Studies as a Basis for Rate Setting," p. 63. Carl G. Barth computed the algebraic formula for Merrick's curve.

We have seen no advertising of stop watches which presents the truth in the quotation above.

And what is worse, we have seen stop-watch advertising which appeals to what in our judgment are base motives. The stop watch has been featured as a device for selecting and firing the less competent men (good management strives to make the less competent more competent by instruction and proper placement); as a whip for driving men to greater effort (good management may on occasion prescribe lesser effort and periods of rest); and as a device which lends itself to secret observations (good management works above board, and time-studies only cooperating workers).

With the prevalence of such merchandising, we do not wonder that workers continue to be prejudiced against the use of the stop watch. Such merchandising and the consequent prejudice are the greatest obstacle to the more general acceptance by workers of a valuable fact-finding device.

PRODUCERS AND NON-PRODUCERS

WE have received the following inquiry from one of our members:

> The writer has been in discussion lately concerning the matter of producers versus non-producers in various types of business. This, naturally, brings up the point of what is considered a producer and what is considered a non-producer.
>
> As you know, in our business here, the making of (the product) includes stamping, and we wonder how you would classify a tool setter who does no productive work when the definition of productive work is the advancing of a piece one step nearer completion. He merely sets the tool for the actual producer.
>
> Second—What would be the status of a die man repairing dies which had in the first instance been in good shape and through use had a punch broken and thus had to be repaired?
>
> What interpretation is usually placed upon an engineer and type fitters, or even a repair gang, who have to repair machines, keep line shafting in order, etc.?
>
> Such information as you have on this, or such information as you can get from members, would indeed be appreciated.

We believe that one of the worth-while services of the Society to its membership is to make available to all through the BULLETIN, the reply to an inquiry concerning a subject of such fundamental importance—not alone because of the reply and its possible influence on management policy, but also because of the constructive controversial correspondence which may be induced.

A Serious Fallacy

In the inquiry as phrased there appears to be a serious fallacy. It is the confusion of "productive or non-productive" with "direct or indirect" application of effort; the assumption that the productivity of an effort varies directly with the measurable directness of the effort in relation to the physical product or the service resulting. This is specifically suggested in the definition of productive work as "the advancing of a piece one step nearer completion."

Definition of Productive

Etymologically, anything is productive which has the quality or power of causing something to be or happen. But this definition, although useful as a starting point, is not sufficient for reply to the question.

The inquiry being from an industrial executive, let us turn to the economist for a definition. He would probably say "that production consists essentially of so changing matter in composition, in form and size, in place, in time and possession as to render it capable of satisfying the wants of the persons who eventually use it;" or, in short, "production consists in the creation of utility—of form, place, time and possession utilities." He might then go on to say that wants are limitless and changeable, and that resources in space, time, materials, equipment and energy are limited; "the problem of production, then, is to organize, plan and control the application of the limited available energy to the limited available material in the limited available space, at our disposal, so correlated in time with reference to the occurrence of our wants, as to make the greatest possible provision for the satisfaction of those wants. And this application of energy to material in space and time—these productive processes—assembles materials into the right combinations, puts them into the right forms and sizes, moves them to the right places and makes them available at the right time to satisfy these wants."[1] Any effort which contributes to this end is productive; the only unproductive effort is that which is wasted.

This definition clears the way, but we believe a still more restricted definition would be helpful. The inquiry is from a representative executive in the present industrial regime; he secures in the open market the energies (labor, mechanical, material, etc.), which he combines in the production process, and these have individual market values which are expressed in the prices he pays for them; he turns out a line of products for which there is a demand and which have market values expressed by the selling prices; he has a high ideal of social service, but at the same time his business is operated for profit; his production processes are complicated by the use of materials in various forms, machines and tools in various forms, and labor energy represented by different craft skills; in his processing there is specialization and division of labor, and the product represents a large variety of items; his product is not only economically demanded, but is socially useful and desirable. From his point of view—that of the manager of an individual enterprise under the conditions specified above—for the purpose of considering what elemental operations are productive and what are not, the following may serve as a useful definition: Any unit of energy (manual effort, mental effort, material, machine, tool, device, etc.) is productive which in combination with other units of energy contributes to the joint product an increment of utility with a market value greater than the market value (cost) of that unit of energy before the combination.

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[1] T. W. Mitchell, in *The Annals*, September, 1920, p. 69.

Illustrations

Case 1. A shop consists of fifty workers at $4.00 per day turning out by hand labor 5,000 units of product having a market value of $500. The minimum essential overhead represents a cost of $50. No better method of production is known than the hand method employed, and the workers represent the highest grade of skill. The aggregate cost of a day's product is $250; the value of the product is $500; the new value created by the combined efforts is $250, or $1 per dollar of energy applied. All elements of the productive operation are productive.

Case 2. A machine is invented which, tended by one of the above men at $4 per day, turns out 500 units of product per day. The essential overhead remains $50. The cost per machine per day (not including labor, but including power, oil, upkeep, interest, depreciation, etc.) is $10. Ten men operating ten machines now turn out the 5,000 units of product worth $500. The cost of the combined energies is $190 (10 men at $4, 10 machines at $10, overhead $50). The new value created by the combined energies of men and machines is $319 ($500—$190), or $1.63 per dollar of energy applied.

Obviously the combined energies of men and machines are more productive than the energies of men alone, measured in output per dollar of cost. *Therefore any element essential to the combination is productive.*

Case 3. In Case 2 the operatives were responsible for keeping their machines and tools in condition, and for bringing material to be worked upon to the machines. An investigation disclosed that the assignment of an expert mechanic to the keeping of machines and tools in condition (at a cost of $8 per day) increased the output (because of the better condition of machines) to 5,500; also the assignment of a tote man (at $3 per day) to bring material to the machines (thereby increasing the actual machining time) brought the output up to 6,000 units per day. The value of the 6,000 units is $600 and the new cost $201. The new value created by this combination of energies is $399, or $1.98 per dollar of energy applied.

Obviously this new combination of energies of men and machines is more productive than the combination in Case 2, and *therefore every element essential to the new combination is productive.*

Case 4. An investigation of Case 3 disclosed the fact that there were times of the day when men and machines were idle because jobs had not been assigned or because materials were short. A dispatch clerk and a balance of stores clerk were appointed at $4 per day each. This brought the costs up to $209 per day. But the elimination of lost time increased the output of all machines to 6,500 units per day with a value of $650. The new value created by the new combination of energies was $441, or $2.11 per dollar of energy applied.

The new combination of energies was more productive than the old and *every element essential to the new combination was productive.*

Case 5. Assume the conditions of Case 4, but modified with the assumption that a variety of products is turned out (as is more frequently the case in industry) and a cost-statistical clerk is appointed and his records soon show that different products show different profits and some even show losses. As a result of his work the items showing losses and small profits are eliminated and all efforts directed to the production of the more profitable lines. The new value added by the new combination of energies and the new application of the combination to selected products is increased 20 per cent, while the cost is increased about 2 per cent. The new combination is more productive than the old, and therefore every element essential to the combination, *including the cost-statistical clerk,* whose work made its new application possible, is productive.

Case 6. An intensive analysis of the operations of a plant over a period discloses irregularity in orders and in operations; discloses periods of loss due to the continuation of maintenance and other indirect costs when the plant is not running. These costs represent an item which must be subtracted from the long-time productivity of the plant. A sales research unit is established which establishes schedules of operation which regularize operations. Records show that the net productivity of the plant over a period is increased by an amount considerably greater than the cost of the research unit. The addition of the research unit to the combination of operations has increased the productivity of the whole and *the sales research unit is therefore a producing unit*—just as much so as the individual worker who manipulates a machine working upon the physical product.

Other cases might be cited showing the productivity of other forms of indirect effort—the contributions of the purchasing agent, the personnel manager, the comptroller, the methods engineer, and so on.

Some Observations

The conventional attitude of mind of the American executive is an attitude inherited from the early frontier shop with its limited market, minimum of mechanical equipment and limited division of labor. In the early days of a Douglas, the shoe manufacturer gathered his small group of skilled workers and apprentices about him in a crude shop, built the shoes by hand and sold them directly in the nearby market. It was natural for him to look upon only those who actually handled the shoes physically as productive—other activities as an incidental "expense" to be avoided. Management of that day was, as much as management of today, a combining of certain basic elements—materials, labor, etc.—in the production of a consumable product, but the elements were simple and few and obvious, and incorrect inferences were made concerning what was and what was not productive. The manager of today has inherited these ideas without giving thought to the significance of large-scale industry, specialization and division of labor.

Whereas in the earlier day the production of a consumable commodity consisted in the combination of a few simple elements, today it consists usually of the combination of a large number of elements, some of them not simple and obvious, and some of them very indirect. The productivity of any one element of the combination cannot be determined by a consideration of that element in the abstract, but by a consideration of its influence in combination with other elements essential to the complete production of the commodity.

If a + b + c produce 100 units of a useful product and if the addition of d results in a production of 150 units, then d, no matter what its nature, provided its value (cost) is less than the value of the 50 additional units, is productive.

It is obvious, therefore, that the common fear of "overhead" in the abstract is not reasonable. The contribution to productivity of an element of overhead cannot be determined except by experiment with the combination of which it is a part. The particular element experimented with may prove to be highly productive or it may prove to be non-productive. But so also may direct labor or a machine.

It is obvious, also, that the determination of the productivity of an element depends upon precise and accurate cost accounting and related statistical analysis; cost accounting which discloses not only the productivity of the combination a + b + c + d, but also the approximate influence of a, b, c and d in the combination.

It is a practicable but not a simple matter to determine the productivity of an element, no matter how indirect it may be, by comparison of combinations in which the element is absent with combinations in which it is present. The net productivity of a + b + c compared with the net productivity of a + b + c + d indicates the contribution of d, although it might be utterly impossible to compute or even estimate the contribution of d by itself.

The most useful method of comparison of the relative productivity of combinations is to reduce cost records to cost of production per unit. Provided the system of cost accounting is logical, accurate and complete (by no means a simple matter), if a + b + c + d shows a lower unit cost than a + b + c, then the manager can feel assured that d is productive; he need not worry whether it apparently has only the most remote relation to manipulation of the physical product, and he can laugh at those who point, with concern based on false assumptions, at his ratio of overhead to prime cost.

The Taylor philosophy and system of management has been frequently criticised as adding to conventional management a large body of "indirect" operations and therefore of "indirect" costs. The criticism is correct as to facts but incorrect in using these facts as a basis for criticism. For it is wrong in implying that these added "indirect" operations and costs are not productive. In this connection a new definition of the Taylor System might be given: A system of management which by research and experiment discovers new *highly productive* indirect elements to add to the combination of production elements; which by special devices of control introduces these new elements into and maintains these elements in the combination; and which by a precise cost accounting constantly verifies the productivity of these indirect elements.

Direct and Indirect Costs

These and other terms have been devised by the accountant for his convenience, and have no implication whatsoever concerning the productivity or non-productivity of an element which represents a cost. The accountant's terminology is perhaps nowhere better given than in the following quotation from Kester's "Accounting: theory and practice," Vol. II, p. 49:

> Three elements enter into the manufacture of a product. These are material, labor, and expense. The problems of factory accounting are therefore those connected with the accounting for the costs of material, labor, and expense. Some terms used in this connection will need explanation. A standard terminology for cost-keeping is becoming fairly well established. Direct and indirect costs, prime cost, factory burden, or overhead expenses, factory cost, full cost or cost to make and sell—these are some of the terms needing definition. Direct costs are those which can be allocated directly to a specific product. They are items which can be separated from all other cost items and applied solely to a particular product. Indirect costs are those which are shared in common by the various products and so must be distributed over them on some equitable basis. Direct costs are sometimes called prime costs. The cost elements which can almost invariably be applied directly to the product are material and labor. The sum of these two items constitute, therefore, the prime or first cost of the product. The other items of cost which are incurred *in the factory* or with which the factory is chargeable are variously called factory expense, overhead, or burden. These indirect costs cannot be charged directly to any specific product, and so they are shared by the entire factory output.
>
> The sum of prime cost plus factory expense constitutes factory cost, i. e., the entire cost of manufacture up to the point at which the product is turned over to the selling department for sale. This is sometimes called total manufacturing cost.
>
> Full cost is the price at which the manufactured article can be made and sold. In other words, to the factory cost must be added its equitable share of all the other costs of conducting the business and also a margin of profit in order to arrive at a selling price. These definitions indicate some of the purposes of cost-keeping.

Now, while all of this is good accounting terminology, it is unfortunate that the term "expense" is set over against the terms "prime cost" and "direct cost." For the contrast suggests that the costs of material and labor are inherently necessary and productive, and therefore not undesirable, while all other costs are "expenses," inherently unnecessary, unproductive, and therefore undesirable. But as a matter of fact all outlays are "expenses" in that they cost something—materials and labor included. The distinction between "direct" and "indirect" is sound and is necessary in accounting technique; but any implication that the productivity of an element is in direct ratio to its directness, is unsound.

Business Cycles

We have suggested that the common unsound identification of direct with productive and of indirect with non-productive is due to the fact that executives have accepted the thinking of an earlier generation which was concerned with simple processing only, and have not thought out their problems anew in the light of the more involved processing, with its specialization and division of labor, with which they are today concerned. There is one other explanation of their fear of the indirect as non-productive; that is their experience with periods of depression.

Both direct and indirect elements of production may be highly productive in a period of business activity, and both may become non-productive in a period of depression—i.e., non-productive from the point of view of the individual enterprise when there is no demand and no market value for its product. By custom direct expenses—for material and labor—can be stopped abruptly under cricumstances of depression. (This may be with respect to labor socially undesirable, and if so social measures may be taken to correct it; but it is nevertheless the fact.) But the indirect expenses are usually not so easily discontinued, and if discontinued, not so easily restored. The elements which involve indirect expense are usually highly skilled or specialized, or for some other reason to be let go only as a last resort. Therefore, in a period of depression they may be retained as an overhead. For instance, in a shop there is in a time of activity one repair man and one dispatch clerk for twenty machines. This ratio has been proved to be in the particular instance the most economical, and both repair man and dispatch clerk are highly productive elements in the combination. But a depression comes on and one-half of the machine operatives are discharged and one-half of the machines left idle. But one-half the repair man and one-half the dispatch clerk cannot be let go. They become relatively less productive. The ratio of "overhead" increases.

For an enterprise belonging to a regime of industry subject to cyclic fluctuations, the problem becomes one of the long-run productivity of the indirect. For a complete cyclic period covering activity and depression, the net productivity of any indirect element is derived by subtracting the loss it causes during the depression from the gain it causes during the activity. The gain caused during a period of activity will almost invariably be greater than the loss caused during the complementary period of depression.

This suggests also why the study of cycles and devising measures for overcoming the influence of cyclic changes is of such great practical importance to the manager. If he can remove from his enterprise the influence of cyclic changes, he can then go ahead towards that better management which utilizes productive indirect elements without fear of the subtractions from productivity compelled by a period of depression of unknown intensity and duration.

THE NEW EMPHASIS IN THE PROBLEM OF REDUCING UNEMPLOYMENT[1]

By H. Feldman[2]

A MOST significant change has taken place in America during the past few years in the analysis of the problem of unemployment, although the steps actually taken to reduce it have been exceedingly few. If we compare the views of economists and official commissions of inquiry of hardly more than a decade ago with those of today, the contrast is indeed striking. Thus, in the Report of the Wainright Commission,[3] which made a thorough study of the subject only eleven years ago, there was not even a hint in the sections on Remedies, Recommendations and Conclusions (pp. 65 to 68) that an important cause of unemployment might be in the slipshod, careless and planless management prevalent in various firms; and no suggestion was made that some employers, at least, could cut down the irregularity of their businesses by improvements in the technique of business administration. The chief recommendations of this commission, like those of its predecessors in many lands, were; first, the establishment of a system of public employment exchanges (a pseudo-remedy on which some people are pinning too strong and naive a faith); second, the directing of children into promising employment (which is important enough for other reasons, but which will have little effect in solving the unemployment problem); and third, the long-time planning of public works by the state and city governments (a very desirable policy but particularly intricate under American political government). The restricted point of view of the time may be seen, for example, in the testimony of Mr. Lindon Bates, Jr., a construction engineer and a student of the unemployment problem, who was one of the principal witnesses called at the Commission's hearing. In response to the request for his constructive suggestions, he said:

> . . . . Since these are the only two conceivable alternatives, it might be recommended, first, that the State undertake as a definite policy to hold some big public work of a public utility in reserve as against hard times; and, second, that this Commission frame as good a bill as is physically possible, for labor exchanges. . . . .[4]

As a background for a discussion of proposals quite different from the "only two conceivable alternatives" which Mr. Bates mentions, a brief review of remedies proposed in recent years will be presented, to show the real advance which the change in emphasis represents.

The Traditionary Remedies for Unemployment

The greatest labors in the study of reducing unemployment were undertaken by the memorable Royal Commission on the Poor Laws and Relief of Distress (Great Britain), which began its work in 1907 and delivered its main report in 1909. Since a major portion of its work dealt with the Relief of the Able-Bodied, the Commission was led squarely into an inquiry as to why so many able-bodied persons were always unemployed and what should be done about it. Its investigators called forth the efforts and cooperation of some of England's greatest thinkers, and notable aid was rendered by Sidney and Beatrice Webb, the latter having been appointed a member of the Commission. The greatest contribution to the subject, however, was the paper presented in 1907 by Mr. William H. Beveridge, then Chairman of the Employment Exchanges Committee of the Central (Unemployed) Body for London, and it is this paper, later expanded into a book with the title "Unemployment—A Problem of Industry," whose analysis was called by the Webbs "perhaps the most momentous (discovery) of this generation in the realm of economic science."[5] Certainly it forms the starting point of the modern program of alleviation, and its influence has been extraordinary.

This great discovery cannot be described adequately in a brief review, and, indeed, one does not wish to deprive a reader of the pleasure of perusing the whole document; yet some mention of its content is necessary. Beveridge begins by dispelling some of the old notions. Unemployment is not due to overpopulation, immigration, changes in the gold supply and other disturbing factors, but to cyclical fluctuation, seasonal irregularity and other maladjustments of the industrial system. The reason why the unemployed are without jobs is not merely because they are superannuated, lazy, mentally or physically deficient, or lacking in special training. "The inquiry must be one into unemployment rather than into the unemployed." Unemployment is a concomitant of the disorganization rampant in the industrial system. Taking his main cue from the obvious evils of casual employment, he shows that at the waterfront, for example, the number of men required by individual docks varies from day to day. Some docks are busy at precisely the same time that others are slack. Never are they all busy at one time. However, because of the lack of organization of the labor market, the individual docks do not draw upon a common fund of labor by sending the same man to various points, but each dock employer buils up his own reserve of labor, which a period of slack reduces to a "stagnant pool." The aggregate of these "stagnant pools" is, therefore, far in excess of the maximum requirements of the waterfront as a whole at any one time. While some of the laborers get employment at other docks when they find their accustomed ones slack, this adjustment is marked by friction and is only slightly effective. The one thing needful, therefore, is a greater fluidity of labor so that more of the casual workers will secure regular employment. This is to be accomplished by a system of public employment exchanges along the waterfront, through which the dock owners must be made to requisition their requirements for casual workers. When this system of labor exchanges has made regular work possible for the majority of workers through a plan of giving preference to part of the available supply, the rest of the laborers, squeezed out in this process of "decasualization," will be taken care of through some well-timed public work. On a larger scale, the labor exchange will aid in the "dovetailing" or seasonal requirements of various trades. To some extent it will also function even in cyclical fluctuations, for the fortunes of individual firms vary sufficiently to allow for some alleviation of the distress by securing openings for those displaced.

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[1] Extracts from the manuscript of a chapter in a forthcoming book on "The Regularization of Employment."

[2] Mr. Feldman was research secretary for the Economic Advisory Committee of the President's Unemployment Conference.

[3] Commission on Employers' Liability and other matters. New York State. Third Report: Unemployment and Lack of Farm Labor. 1911.

[4] Ibid, p. 172.

[5] Sidney and Beatrice Webb, "The Prevention of Destitution," p. 130. London, 1911.

Brilliant as Beveridge's analysis is, it contains a very serious omission. As a consequence, his remedial program falls far short of his penetrating insight. His point of view towards business firms is entirely extramural. He wants them to employ all their labor through a central source (to be made compulsory by law in some cases), but he never questions the need of the excessive hiring and firing in which inefficient or heartless management may indulge. He seems to have overlooked the many crimes against common sense perpetrated daily by careless business firms. When one's eye alights with relief on the term "business organization," it is to find that Beveridge is using it in another meaning—"dovetailing," organization of the labor market, etc.—and that it does not refer to self-improvement within a firm. The question as to whether the individual business need forever be conducted in such a planless manner as to result in remorseless hiring and firing is not even suggested, while emphasis is put on the obligation of employers to cooperate with other employers and with state agencies in adjusting the workers so displaced to the opportunities in the labor market.

This partial blindness (for such it must be called) has pervaded most of the literature that followed. Neither the Majority nor the Minority Report of the famous Poor Law Commission gave the matter of plant or business efficiency more than passing reference, and no mention at all is made to this possibility in the separate conclusions and recommendations which the divided Commission published. As astute a reformer as Sidney Webb failed to see anything in this aspect of the problem. The Minutes of Evidence show that Mrs. Bosanquet asked him very pointedly why attention should not be given to the responsibility of employers for regularization of employment. She said: "Is it not possible to take the line that if employers want more labor in June than in January they must be prepared to strengthen their present staff and reorganize their work, rather than encourage them by maintaining for them . . . a reservoir from which they can withdraw them when they like?" Sidney Webb replied that it was impossible. After a rather insistent rejoinder by Mrs. Bosanquet, stressing the desirability of working along that line, Mr. Webb backed down by saying he agreed with her, provided it could be done; but in the admirable book "The Prevention of Destitution," by Sidney and Beatrice Webb, subsequently published, the chapters on unemployment never mention the approach through better business management, while at the same time possibilities infinitely more fanciful and less practical are proposed.

The Webbs, indeed, reduced the problem to simplicity in this book. Finding that the slack seasons of different trades occur at different seasons of the year, they conclude that there is practically no seasonal fluctuation in the demand for labor in the community as a whole. Without giving full consideration to the innumerable and almost insurmountable difficulties in the versatile use of this labor power, they find their remedy in an efficient clearing house for labor, in the form of a universally accepted and thoroughly efficient employment exchange system.

Even B. Seebohm Rowntree, whose study of unemployment in New York about this time has evidently not suggested to him the importance of regularization by business firms, makes no mention of the possibility in his later work, "The Way to Industrial Peace," published in 1914, which contains a summary of his views on the prevention of unemployment. And almost to this day the omission of this essential phase of the remedial program has persisted in England. This can be seen, for example, in the document "Labour and the New Social Order," a keen and eloquent report on reconstruction by the Sub-Committee of the British Labor Party (published in this country in the monthly Labor Review and as a special supplement in *The New Republic* of February 16, 1918). While the Committee does not hesitate to propose any radical change in method or any burden on employers, the remedies advanced do not include an insistence on greater efficiency in private business while demanding it in public affairs. It is said that Sidney Webb had a great deal to do with drawing up the document, and it certainly reflects his point of view.

The American Attitude Toward the Problem

It is American thinking that has put the emphasis on the strengthening of each business within itself. The traditional (if not stubborn) dependence on individual initiative of American statesmen and of business leaders has stood it in good stead for once, and the proposals to spread the inefficiency of individual business over the whole country through schemes for "dovetailing" labor or compulsory insurance along the British model have not taken root. The fact that much of the opposition to such measures is selfish and reactionary is only of incidental importance, for liberal thinkers as well have come to realize that the American emphasis on regularization will lead to the most fundamental progress.

This American attitude was reflected, for example, in some of the studies made by the Committee on Women's Work of the Russell Sage foundation as far back as 1911 and 1912. This committee, of which Prof. Henry H. Seager was chairman, included, among others, Prof. Samuel McCune Lindsay and Miss Mary Van Kleeck, all of whom have been prominent in the movement. For example, the three books by Miss Van Kleeck[6] and the one by Miss Louise C. Odencranz[7] are not only excellent analyses of various phases of the problem of irregular work in the particular trades studied, but the authors do not hesitate to make it obvious that the situation might have been very different if some of the ingenuity the employers have shown in other directions had been applied to the problem of steadying employment for their workers.

What I have called the American attitude on the problem of unemployment may be said to have assumed a definite form at the First National Conference on Unemployment (in New York City, February 27-28, 1914), when Prof. Seager, Chairman of the Conference and then President of the American Association for Labor Legislation, was able to say at the beginning of the second day's session:

> I believe that notwithstanding the fact that so many different aspects of the problem were touched upon in the addresses yesterday, ... as speaker followed speaker I felt that the whole matter stood out more and more clearly, and that what ought to be done in this country . . . . became more and more obvious.
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> The aspect of the question most impressed upon my own thought was the necessity of regularizing employment. It is still true that nine out of ten employers employ and discharge their wage-earners with very little consideration for the welfare of the wage-earner.[8]

Those who were in charge of the arrangements for the conference included Mr. Henry S. Dennison, whose business experience was particularly valuable in the formulation of policy. The recommendations of the conference, and particularly the Standard Recommendations for the Prevention and Relief of Unemployment, which have been issued from time to time by the American Association for Labor Legislation through its secretary, Dr. John B. Andrews, have given conspicuous place to what is clearly the American contribution to the subject of unemployment, viz., its elimination in large part through sound management technique. This has been reflected in subsequent researches. The Mayor's Committee on Unemployment in New

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[6] Women in the Bookbinding Trade, 1913. (With an introduction by Henry R. Seager.) Artificial Flower Makers, 1913. A Seasonal Industry: A Study of the Millinery Trade in New York, 1917.

[7] Italian Women in Industry. Published in 1919, but based largely on earlier data.

[8] American Labor Legislation Review, May, 1914, p. 311.

York City, in its report of January, 1916, gave considerable space to this aspect of the problem. It was the principal phase considered in the investigation initiated about the same time by the Philadelphia Department of Public Works (when Morris L. Cooke was its Director), which resulted in an excellent concrete study of experience by Joseph H. Willits, of the Wharton School, University of Pennsylvania. Another example of the practical turn of mind is the report of the Ontario Commission on Unemployment (1916), which said (p. 12):

> Employers may largely regularize their staffs of workers (1) by improved method of employment and training, which will lessen the present "turnover" of employees; (2) by adding new lines of products to ensure greater continuity of employment; (3) by standardizing a portion of products, thereby making it feasible to manufacture for stock more largely in slack seasons; (4) by securing orders from customers longer in advance than is now the practice, so that the factory output may be made more uniform, and (5) by developing export trade. . . .

Since that time the analysis of business methods that impede regularization has grown more refined. The most important investigation by far in this field has been that of the Committee on Waste of the Federated American Engineering Societies—a report made by engineers and business men, not by poor-relief officers. The recent Unemployment Conference held in Washington by call of the President showed the same tendency. The personnel of the members and their approach to the problem of unemployment had an unmistakeable management basis.

This is true even in the proposals for insurance. Compulsory contributory unemployment insurance has made no headway here. But in 1916 the Report of the Mayor's Committee of New York City emphasized the importance of having any insurance scheme operate as public pressure on employers to regularize. Such has been the basis of the first agreement providing for an insurance fund, arranged by associations of employees and employers in the Ladies Garment Industry in Cleveland, which, as is well known, levies the whole cost on the employers, and thus gives them a chance to save it all by efficient management, as some indeed have done.[9] Such is also the basis of American proposals for legislative action, in the remarkable effective provisions of the Huber Bill in Wisconsin sponsored by Prof. Commons.[10] And furthermore, American firms have begun to draw up their own insurance plans on the same principle of putting the burden on the employer—that is, on management. The Dennison Manufacturing Company's insurance fund, the funds under the Deering-Milliken Company supervision, as well as a few other plans of which the author knows in confidence, are examples of the trend in placing responsibility for unemployment in America where it belongs.

Firms whose heads are members of the Taylor Society have been particularly prominent in their progress toward regularization. At The Joseph & Feiss Company, for instance, Miss Mary Gilson, who has been the Superintendent of Employment and Service for about ten years, told the author that she did not recollect a single instance of permanent layoff for lack of work. This, in a factory of the hectic clothing industry, is a most remarkable achievement! The Dennison Manufacturing Company has reduced lay-offs to a minimum.[11] The Hickey-Freeman Company has gone on for many years, through thick and thin, without laying off any employees permanently for lack of work. These and other firms have therefore done more than the remedial programs of various commissions could ever have hoped to accomplish, and the superiority of strengthening the management policy *and curing the evil of unemployment from within* stands forth the more clearly.

Let us for a moment review a few of the main proposals upon which thinkers have put emphasis in the past and which are still featured, so that we may later contrast their efficiency with those proposals which are more modern by relating the experience of one firm which I have selected from among those whose technique I have had the privilege of studying.

1. *A Public Employment Exchange System.* This proposal has been advocated by every student of the problem. When combined with compulsion upon the employer, as in the case of the dock employers, the remedy would undoubtedly achieve the purpose of considerable decasualization of casual labor. However, it leaves untouched the problem of individual management. While the author has aided in memorializing his representatives in Congress to pass the Kenyon-Nolan Bill, so that a national system of labor exchanges would be established in this country, objection can properly be raised against this remedy merely on the ground of over-emphasis. The inherent limitations of

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[9] "Experience under the Employment Guaranty in the Cleveland Garment Industry." U. S. Monthly Labor Review, August, 1922, p. 135-8.

[10] See The Survey, Oct. 1, 1921.

[11] For a thorough analysis of the technique of the Dennison Manufacturing Company, see series of articles on "Outstanding Features of Dennison Management" by H. Feldman, in *Industrial Management,* August, September and October, 1922.

this form of labor exchange are too many to be taken up here, but they are discussed in the larger work of which this chapter is part of the introduction. An excellent piece of advice was offered recently, however, by Dr. H. S. Person in an address delivered before the American Association of Public Employment Offices, Ottawa, Sept. 20, 1920:

> If I were to leave you with one thought it would be this: attempt to work yourselves out of a job. You will never be able to do it, for there is bound to be more or less unemployment, and your service is a splendid effort to relieve unemployment. Just now, confronted with the gigantic disorganization resulting from war, your problem is a gigantic one. But look ahead to the more settled conditions of peace; and resolve from this moment on to conduct a campaign of education for better management in every plant with which you have contact, so that unemployment may be reduced to a minimum.

2. *"Dovetailing" and the Mobility of Labor.* This idea has had a glamour which its practical importance does not at all support. With respect to any systematic dovetailing between industries, the author has not been able to uncover a single authentic and successful instance. A psychoanalyst might discover back of the advocacy of the mobility of labor a heritage of the nomad past that impels intellectuals, keen for travel, to see a peculiar facination in free-moving laborers. Thus, in "Seasonal Trades," edited by Sidney Webb, Mrs. Barbara Drake has a paper on "The Waiter" which pictures the route of the migratory waiter who follows the fashionable seasons and transfers his studied elegance thus:

> The Riviera, Italy, Egypt, Switzerland, and the South Coast in the winter; the fashionable seasons of London, Paris, and other great cities in the spring; in the summer the British and foreign seaside seasons; Switzerland again; the "Spas" and Scotland in the autumn (p. 96).

In the introduction to the same book Miss Juliet Poyntz says:

> Even an economic product like a wheat crop, which seems so completely under the domination of seasonal influences, is, considering the production of the world as a whole, not seasonal at all. There is no month of the year in which a wheat crop is not produced in some country of the world (pp. 55-56),

a suggestion which conjures up the vision of a vast horde of wandering men, like Arabs over the plains, moving from continent to continent, and like Vikings, embarking for distant climes.

Mobility has a limited application. Its difficulties, from the standpoint of efficiency, are very many, and the experience with mobile (or shall we say fluid?) labor during the war period has not endeared this form of operation to industrial executives, no matter how much the interest in the welfare of the wage-earning class. In fact, many will say that if we need anything today it is to reduce the mobility (i.e. turnover) of labor, and to make each community self-centered with respect to its labor supply, a remedy which the author advocates at length in other chapters. And Prof. Don D. Lescohier, formerly Superintendent of the Minnesota Public Employment Office, in his book, "The Labor Market," quite pointedly says (p. 304):

> One of the essential labor problems that confront the United States is the checking and the reduction of the migrating of labor. Local self-sufficiency in labor supply is a goal to be striven for by every community. . . . The Minnesota office . . . . was able to entirely eliminate two-thirds of the state from the Minneapolis market.

To the practical business administrator the difficulties of labor mobility as a problem of management are obvious enough; if transfer within a firm is attended with many complexities, the organization of the whole market so that efficient dovetailing will result from mobile labor presents insuperable difficulties. And from the social point of view all our panegyrics of the influence of home life will have to be discarded if we take any serious stock in the proposal to have wandering hordes of men touring the country to eke out their living. In an article on the I. W. W. in the Atlantic Monthly of November, 1917 (pp. 651-662), Carleton Parker said:

> Numerous statistical studies show that the average term of employment of the migratory worker is between ten and fourteen days. With a stake of ten dollars he will retire to a hobo camp beside some stream,—his "jungle" as the road vernacular has it—and, adding his daily quarter or half dollar to the "Mulligan fund," he will live on it until the stake is gone. If he inclines to live further on the charity of the newcomers, he is styled a "jungle buzzard" and cast forth. He then resumes his haphazard search for a job, the only economic plan in his mind being a faint realization that about August he must begin to accumulate his thirty-dollar winter stake. Each year finds him physically in worse disrepair, psychologically more hopeless, morally more bitter and anti-social. His importance to any forecast of our nation's future lies in the uncomfortable fact that proportionally he is increasing in number and his recruiting group above is increasing in unrest and economic instability. . . . *The casual migratory laborers are the finished product of an economic environment which seems cruelly efficient in turning out human beings modeled after all the standards which society abhors.* (Italics mine.)

3. *The Long-Range Planning of Public Work.* This is certainly a desirable idea, but social reformers will have to "take a lot of punishment" for every step they actually make in this direction. The proposal was quite proper in England, France or Germany, accustomed to unified systems of public administration and to national control over local government. In a country such as England, where the whole tendency in recent decades has been to subordinate completely the House of Lords, the House of Commons and even the Cabinet to a single officer, the Prime Minister, who is entrusted with both executive and legislative leadership, it is much more natural for long-range policies to be suggested. B. Seebohm Rowntree and Mr. Bruno Lasker, in their

book on "Unemployment, A Social Study," published in 1911, describe a scheme of afforestation which would occupy the unemployed of York a few months a year for eighty years, and even have the temerity to estimate (p. 76) that "At the end of eighty years, when the whole forest reaches maturity, forty-two men would be permanently employed, and three hundred eighty-two for four months each winter." In America, however, harsh critics have maintained that we have been unable to secure a consistent policy even for the eight years of a double term! Therefore, until we improve our national system of administration, as well as that of our states and cities, we can expect little long-range planning. Look at the situation even now! In spite of the severest depression of the century we cannot get legislation from the Congress that will even scratch the surface of long-range planning! Even appropriations for immediate stimulation of public work have been denied. The most one can say is that the effort to secure such long-range planning is indeed worth while, but the results from it will be very meagre for decades to come. For efficiency in our system of government (if I may paraphase the prophesy that Samuel Gompers made in another connection to Mr. Untermeyer) will not come next January 1st at four o'clock if it doesn't rain.

4. *The Training of the Unemployed.* The Minority Report of the Royal Poor Law Commission was quite shocked at the system of blind alley employment for young people, and called its discovery "perhaps the gravest of all the grave facts which this Commission has laid bare."[12] But the great interest in this phase of employment is really due to the fact that so many investigators of unemployment have dealt with the relief of the unemployed, and of those who resort to charity; the proportion of unskilled and unreliable persons among those applying for charity is far greater than the proportion of unskilled and unreliable in the community as a whole. Sidney Webb and Beveridge as well as others make it clear that lack of training is only the incidental reason why particular individuals are unemployed, and Webb goes on to say that if employers could not distinguish between employees on the ground of skill they would perhaps find a distinction in the color of their hair. The President's Unemployment Conference last year paid no attention to this phase of the problem at all, and since it has but slight reference to the major issues, their attitude was undoubtedly correct. In this connection it may be remarked that some of the most efficient firms in the country, notably, for instance, The Joseph & Feiss Company, really prefer untrained employees because the methods of work taught by the company are so different from those of other firms. As elsewhere explained, however, there is a certain kind of training which undoubtedly will help to reduce unemployment, but the current literature has not reflected it.

5. *Insurance.* I have already treated this factor, and it is clear that American thinking on this subject is far in advance of the English plan of compulsory and contributory insurance, which penalizes the well-managed and the poorly-managed firm alike, or the Ghent plan of subsidizing trade union funds, proposed by the Webbs, since that takes the whole responsibility away from management.

Let us now consider the application of what Mr. Richard A. Feiss has called "The Engineering Approach to the Problem of Continuous Employment" in a concrete instance. From the various firms which have tried to regularize their production and employment through improved management, I have selected a simple case which presents a striking instance of the efficacy of the new method.

The Hills Brothers Company—"Dromedary" Dates

The Accompanying Chart A presents a graphic account of two important factors of the business of the Hills Brothers Company, largest packers and distributors of dates in the country. The dotted line shows the sales, and in 1921, as well as in other years, there was a pronounced seasonal peak in the three autumn months. The year 1921 was not a year of depression for this company, in fact, the demand for dates was greater than the supply. Yet the curve of production, (packing —the solid line) shows an extreme fluctuation, with a sharp peak preceded by a deep, wide hollow. In terms of employment it meant many men and women laid off, many persons left without income temporarily and a very much impaired morale in the plant.

Now what would have been the solution for this situation in the light of the traditionary program of remedies? First: the employees would more readily go to the Brooklyn office of the public employment exchange and endeavor to find work—perhaps in a needle factory in New York, or possibly a tire factory in Akron. Second: some form of insurance would support, on a meagre basis, those who could not get located. Third: some form of public work which Brooklyn presumably had long planned for a year of depression would suffer the competition of a group of workers whose trade

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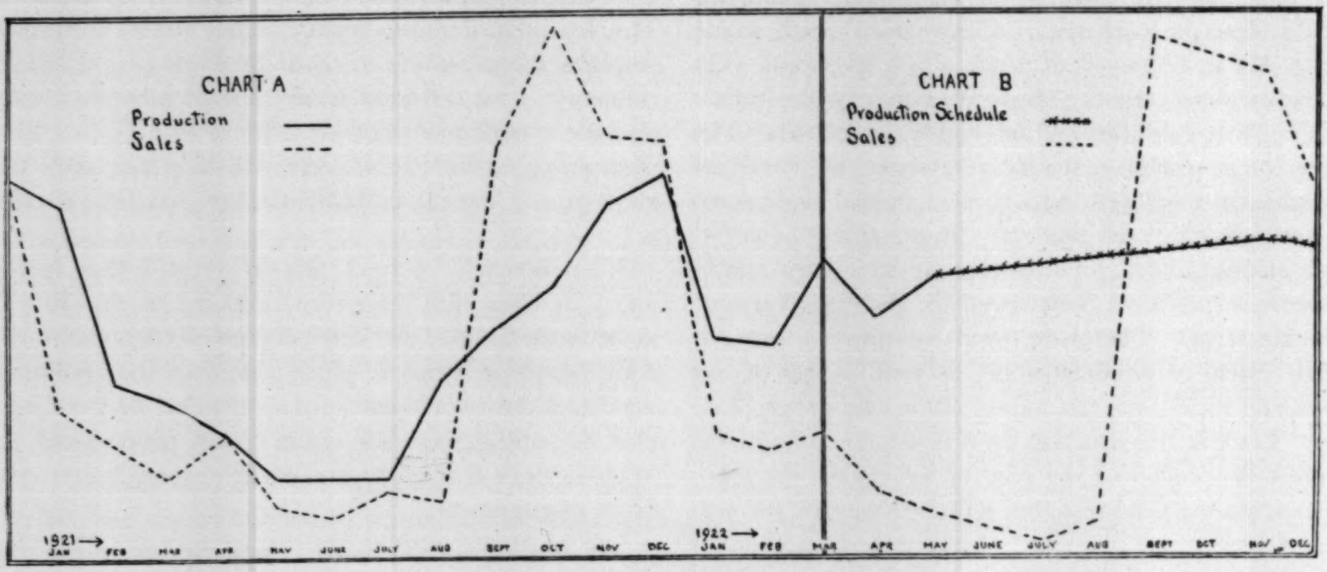
[12] Royal Commission on the Relief of Distress. (Great Britain). 1909, Vol. 37, p. 1167.



Charts A and B

was not cyclically depressed at all but which was merely having its regular seasonal slack. Fourth: some of the girls might have been offered training for the needle trades or some other occupation which perhaps is itself irregular. And in the meanwhile public effort would have provided no stimulus to the Hills Brothers Company to heal itself.

Fortunately, within this firm there is stimulus enough in its ideal of sound business progress and the maximum comfort for its workers. Its president, Mr. L. R. Eastman, and other officers have not been unmindful of the possibilities of regularization. To their surprise, this proved not nearly so hard as they at first thought it might be. They had recognized the seriousness of the problem and for nearly ten years it had been considered from various angles. A good deal of effort had been exerted in the direction of stimulating a more even demand. Selling and advertising had been adjusted to this purpose. Other expedients, including the analysis of various production methods had been studied. None of these efforts had proved completely effective and it was not until 1921 that the real solution was discovered—a solution which had often suggested itself but which it took time and experimentation to develop. Mr. Ernest G. Draper, Comptroller of the company, recently wrote to the author:

> The discovery of our refrigeration process was quite simple. When we asked ourselves the question how best to regularize our package date business, the first answer that came to our mind was the one which we ultimately adopted. Practically all that we had to do was to determine by chemical test the temperature in which dates kept the best and longest. Having found the answer to that question, the rest of the problem was merely to so arrange our working schedules as to conform to the newer and steadier methods of packing after, of course, we had erected the cold storage plant. . . . . The results in ease and better quality of manufacture are already apparent. . . . . A feasible and comparatively simple answer to the problem was found when we determined to give the matter some thought. It had never occurred to us to do so in the past and the chances are that if we had not done so we would today be working along the old wasteful and inefficient lines.

The progress achieved can be seen in Chart B. As a result of a policy inaugurated in March, 1922, instead of manufacturing for the peak at one time, the company now manufacture practically an even amount regularly, basing the production schedule on the anticipated sales of the whole year. The production curve will therefore either be steady or rising gradually, and the peaks and hollows in employment will be practically eliminated.

I do not pretend that the problem is equally simple in all industries. In the Dennison Manufacturing Company, for example, the synthesis of regularization was achieved only after years of pretty detailed experiment and endeavor.[13] The need of versatile management will lead us most directly to fundamental progress in regularizing industry. When efficient management has done all that should be expected of it, the disease of unemployment will be so moderated that a complete cure through the aid of the other and less important remedies discussed should not be difficult.

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[13] See foot note 11.

DESCRIPTION OF A DEPARTMENT FOR MAKING ROUGH BOXES[1]

BY H. V. S. TINGLEY[2]

IT IS the purpose of this article to describe fully a department for the manufacture of rough paper boxes. The description deals with the department as it now exists and does not touch upon the improvements which might be made. Although the department is by no means perfect, it has many good features which are of interest.

The boxes produced in the department are used for packing and shipping paper products and receive very rough treatment. They are, therefore, of the cheaper grade. The total production per day averages about eighteen thousand complete boxes, this production being obtained in one room 214 feet long by 57 feet wide.

Description of Box

In order to understand clearly the method of manufacture and the reasons for the floor layout which will be discussed later, we must first get some idea of the type of box made.

The principal raw material is an unfinished pasteboard. This board is scored and cut into shapes known as blanks as shown in the first sketch in Figure 1. The score marks are cuts about two-thirds way through the board and are made along the lines which are to be the edges of the box. The blanks are bent 90° at the score marks, the latter being on the outside of the bend, which brings the sides and flanges to their proper positions. The ends are glued on to the flanges, and the box assumes its correct form. The corners and edges must now be strengthened by applying strips of gummed paper to all joints. When this is done the box is finished. The three stages in the making of a box are shown in Figure 1 while typical boxes appear in Figure 2.

Materials Used for Box

The materials used for boxes are the pasteboard for the blanks, the stay paper, the stripping paper, and the glue for fastening the parts together.

Four different grades of pasteboard are used, the grade depending on the finish desired on the complete box. No. 2 newsboard is used most extensively and comprises about three-quarters of the board used. It is of a grey color, being made from old newspapers which have been de-inked, and has a rather rough finish. It is reasonably strong and costs a little over a dollar per fifty-pound bundle.

A somewhat inferior grade of board is chipped strawboard. This material, which is used for about one-fifth of the boxes, is made from scrap newsboard and gets its name from its brownish yellow color. It costs about 12 per cent less than the No. 2 newsboard.

For the few boxes requiring a better finish than No. 2 newsboard affords, No. 4 newsboard is used. This board is made from over-issues of newspapers and is given a comparatively smooth finish at the mill. It costs about 35 per cent more than the No. 2 newsboard.

The best board which the department uses is a T. Manila-lined newsboard which, as its name implies, is made by pasting a sheet of slate colored T. Manila paper on one side of a sheet of smooth newsboard. Its cost is about three times that of No. 2 newsboard.

All of the boards listed above may be procured in thicknesses varying from about .02″ to .07″ as indicated by a gauge number distinct from the quality number. The gauge number is the quantity of sheets of the same thmickness and of basis size (26″x38″) which make up a bundle of 50 lbs. The approximate thickness in inches may be determined by dividing 2 by the board number. No. 50 and No. 60 board are the most convenient for making rough boxes and these are the numbers most frequently used; No. 60 for about two-thirds of the boxes and No. 50 for the other third.

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[1] This study was not made for the purpose of publication; it is simply a by-product of the educational methods of the Dennison Manufacturing Company. First one man and then another spent time on the study; it was completed by Mr. Tingley. It has, therefore, a double interest for the reader; as a study of the organization, layout, processes and results of a department, and as a method of training through such investigations. Of it the firm writes: "The labor involved in getting this information together was well worth the cost in the education it has given; the information it contains will probably be superseded in a few years' time by improved methods of manufacture and control. It is most certainly tremendously different today from what it was five years ago; but any study of details such as this is a sure means of convincing an investigator that a lot more improvements are possible, and should be worked out." (Editor.)

[2] Dennison Manufacturing Company, Framingham, Mass.

Stay paper is used for binding the intersections of the sides and ends of the boxes and covers. There are two different grades. Straw colored boxes are finished with a ¾" wide Kraft paper of a basic weight of 132 lbs. per ream of 500 sheets sized 25"x40". Slate colored boxes require a ¾" grey manila paper having a basic weight of 127 lbs.

Both of these papers are gummed before use with an animal glue, about 24 lbs. of glue being spread per basic ream of paper.

The paper applied to the intersection of the bottom or top with the sides or ends is known as stripping paper. For this purpose, with strawboard a ⅞" wide 42 lb. Kraft paper is employed, but with newsboards a grey manila paper of the same width and weight.

Both of these papers are gummed during the process of stripping with a cold liquid vegetable glue which is kept at a temperature of about 110° F, so that it will flow easily and dry quickly.

The gum used for sticking the ends on the boxes depends on the kind of board and the type of machine used. There are several gums for this purpose on the market and some of them are good.

Manufacture of the Box

The newsboard is received from the mill in various sizes and thicknesses and is stored in the basement for a month or so for seasoning. For boxes in great demand special sizes and thicknesses of board are ordered; the size is such as to result in as little waste as possible; the thickness depends on the size of the box and its future contents.

When the board is needed for an order it is trucked to the box department and placed near a double scorer. It is the function of the double scorer to cut the board into blanks of the exact size needed and at the same time to score the blanks along the lines of flexure. The machine accomplishes this by receiving each separate sheet of board between a set of rolling knives and a soft iron cylinder and then automatically feeding it to a second set of knives and cylinder set at right angles to the first. The machine, operated by a semi-skilled operator who sets the knives, feeds in the board, and breaks apart the blanks, cuts an average of 790 sheets of board an hour. It runs at a speed of about 140 R. P. M., and requires a 4" belt to turn its 16" diam. pulley.

The double scoring machine operator breaks apart the blanks coming from his machine and places them on a castored table (Figure 3). The castored table is designed to move goods from one machine to another in the same department and is a great labor saver. The table receives the material completed by one machine and holds it until it is needed by the next succeeding machine. The table with the material is then wheeled over and the second machine fed directly from it. This is precisely what occurs to the material passing between the double scorer and the miterer or corner cutter.

Mitering is the operation of cutting the V-shaped notches in the blank and is performed on all box blanks which have their ends cut separately, so that the flanges will not overlap at the corners. Cornering is the operation of cutting the square corners from the blanks and is performed on cover blanks with which the ends are cut contiguously. It accomplishes the same purpose as mitering.

If the blanks are to be cornered, the castored table is pushed over to the double-corner cutting machine. The operator picks up several thicknesses of the blanks and places the ends in the machine. Two reciprocating 90° knives come down on the blanks and shear off the two end corners. The blanks are turned about and the other two corners cut off. When properly cornered, the blanks are placed on another castored table for the bender. The double-corner cutter receives its power through a 3" belt and a 20" pulley and runs at a speed of 140 R. P. M. A modification of the double-corner cutter is the miterer-corner cutter. One side of the machine is a duplicate of the double-corner cutter and performs the same operation. The other side is fitted with two V-shaped knives which cut the board in the same manner as the double-corner cutter. Both machines will cut an average of about 2250 blanks an hour when running at a speed of 140 R. P. M. The miterer-corner cutter requires a 4¼" belt to turn its 20" pulley.

From the corner cutter or miterer, all corner-cut blanks and all mitered blanks which are to receive their ends on a single ender are pushed on another castored table to the nearest bending machine. The blanks are piled on the receiving end of the machine and an endless belt picks them one at a time in rapid succession from the bottom of the pile, passes them over and under adjustable guides, which bend the flanges up and back, and then shoots them at a rate of 3,500 an hour on to the receiving bank where they nest themselves in a neat pile. The machine is belt driven by a 3" belt turning a 14" pulley at 140 R. P. M.

The blanks are now stored by the bending-machine operator in stock bins or in apportioned spaces on the floor until they are to be made into boxes.

The rectangular ends which are to be glued to the blanks are cut on the guillotine knife. The machine takes its name from a well-known apparatus of the same name and operates in a similar manner. Raw board, or sometimes the trimmings from the double scorers, is piled on the platform of the machine in layers up to four inches thick, and is set under the knife in the desired position by means of a movable back guide. A lever is manipulated and a large knife extending the width of the platform is forced down, cutting all thicknesses of the board at once. The strips of board cut by this first operation are then placed in the machine at right angles to the first position and cut off to a desired dimension. In this manner 4,250 ends may be cut in an hour. Power is applied by a 3" belt to the 16" pulley turning at a speed of 150 R. P. M.

When the blanks are to be made up they are taken from their storage location to either the single or the double ending machine. Small quantities are done on the single ender, but jobs of over 2,000 boxes warrant the use of the double ender. The double ender will do the work about two or three times as quickly as the single machine, but requires special blocks and a longer time for set up. These machines apply glue to the flanges of the blanks and then paste the ends in place.

The single enders apply the ends which have been cut by the guillotine knife to the bent blanks which come from the bending machine. The ends are fed into a hopper at the top of the machine, are glued automatically, and one at a time are placed in position to be pressed on the box blanks. The box blanks are taken by the operator from a table at his side and are held on an adjustable form. Upon pressure on a foot treadle the machine actuates a toggle joint which presses the form holding the box blanks against the glued end. The box is turned over by hand and the other end attached in a similar manner. An average operator can handle 300 boxes in an hour. The single ender is fitted with a 16" pulley driven by a 3" belt and runs at a speed of 180 R. P. M.

Large lots of much used boxes are made on the double-ending machine because it is entirely automatic. The box blanks are piled at the end of the machine and the ends in hoppers near the front of the machine. The box blanks are automatically fed under a form which comes down on the blank and forces it between two guides, thus bending up the sides of the blank to their proper positions. The flanges are then glued and the ends pressed into proper place, both at the same time. The boxes drop on to an endless moving belt which delivers them to the rear of the machine. One man tending this machine can produce about 600 boxes an hour, but if greater production is desired a girl helper can be used to receive and stack the boxes as delivered from the belt. The two working on the machine will produce about half again as rapidly. The machine is driven by a 16" pulley running at about 175 R. P. M. A 3" belt is used.

All of the machines described above, together with an extra double scorer, bender, single ender and double ender, are driven through 2" line shafting by a 5 H. P. 950 R. P. M. electric motor.

After the boxes have been formed they must be stayed and stripped to secure strength and stiffness. Staying is the process of sticking a strip of ¾" gummed paper along the sides and end intersections of the box. Stripping is the process of applying a similar ⅞" strip around the edges where the sides or ends meet the bottom. Covers are also stayed and stripped; stayed in order to hold the sides and ends together and stripped for strength and stiffness. The two machines which do this work, the staying machine and the stripping machine or covering machine, are run as a single production unit because each turns out approximately the same number of boxes or covers per hour.

The boxes are carried from the ending machines by a move man and are placed at the right hand of a staying machine. The girl operating the machine takes one box at a time and places it in the proper position on the machine which presses a gummed stay into place on a corner. This operation is rapidly repeated for the other three corners of the box. The stayed box is placed on a table at the left of the machine in a convenient position for the stripper. The box stayer is fitted with an 18"x4½" pulley and is driven at a speed of 130 R. P. M. by a 3" belt from 2" line shafting. The cover stayer uses a 12"x3¾" pulley and is driven at 140 R. P. M. through a 2½" belt by an individual 1/5 H. P. motor.

Box covering machines are used for the operation of stripping. The girl operator takes the boxes from the table at her right hand, where they have been placed after staying, and places them on a wooden block on her machine; one wooden block is required for each different size of box made. The end of the paper strip which has already been glued by an attachment on the machine, is applied to the bottom edge of the box. At a touch on the foot treadle the box revolves, drawing the strip into place as guided and pressed by the operator. An automatic cut-off cuts the strip at the required length. The box is now removed from the block and set on a table where an assistant bends the strip over on to the bottom and rubs it down. The covering machines used for box stripping are driven from line shafting through ½" round belts to 8" pulleys. Their speed is about 400 R. P. M. The cover strippers are of a smaller size than the box strippers and require only ⅜" round belts to turn their 8" pulleys at 400 R. P. M. They are driven by individual ⅓ H. P. electric motors.

All of the box staying and stripping machines are driven through 2" line shafting by a 5 H. P. electric motor.

Routing

The sequence of operations described in the preceding section is illustrated graphically in the "Routing Map" (Figure 4). In this map, each circle represents a facility and each straight line the course of work to and from these facilities. The figures on the lines show the average number of pieces (boxes or covers) or the number of pairs of ends which pass over each course in an hour.

Turning to the map, we observe that the newsboard is brought up the elevator from the basement storage and is distributed to either a double scorer or the guillotine. After being scored, the blanks are delivered to a corner cutter or the mitering machine. It will be observed that only 2,140 box forms are delivered to the mitering machine, whereas a total of 4,610 forms are corner cut. This shows us that about 1,240 boxes per hour are corner cut and made in the same manner as the covers. The corner-cut blanks and the few mitered blanks which are to be used on the single enders are passed through one of the two benders and are delivered to a stock bin. The blanks for the double enders are delivered either to a stock bin or direct to the machine. Ends cut on the guillotine knife are kept in stock until needed. From the ending machines the boxes pass to one of the five groups of box staying and stripping machines. The 1,200 odd corner cut boxes come from the stock bin where they have been holding and also pass through the five box machines. The 3,300 odd boxes are then fitted with the corresponding number of covers. Some are delivered loose to the ordering department and some are bundled before delivery.

Floor Layout

The floor plan in Figure 5 shows how the routing map has been used to advantage in laying out the machines in the department. The fundamental idea is to have the machines in the order in which the work is to progress. They should be placed near together to minimize handling of material but far enough apart to avoid crowding. Machines upon which close work is to be done should be placed near the windows, and machines receiving their power through overhead shafting should be grouped in order to keep this expense low. The layout adopted fulfills all of these requirements reasonably well.

The machines are so arranged that the raw board, started near one end of the room, goes through the successive operations and emerges at the other end in the form of finished boxes. The double scorers which perform the first operation sometimes require very close work and are therefore placed near the windows. From the scorers the blanks progress through the miterer, corner cutters, and benders shown in Figure 6 to the center aisle across which they are located in the stock bins. The bending machines (Figure 7) are located between the cutting machinery and the box-staying and stripping machines so that the ended boxes will be deposited within easy carrying distance of the latter. Staying and stripping machines are set on the bias as shown on account of the light and so that the boxes or covers may be started from the outside of the room and flow directly towards the center. The battery of cover-making machines illustrated in Figure 8, is placed on one side of the room and the box machines on the other, so that the boxes and covers come from either side of the center, are here united in the assembly space and delivered via the center aisle to the customer department. Figure 9 is a view of the box stripping machines.

Production Control

A box department by nature of its product is required to give service to the other producing departments. It is essential that the boxes be delivered within a few hours of the time when they are wanted; no later, because production must not be delayed; no sooner, because boxes are bulky and little floor space is available for their storage. Planning must, therefore, be very close and consequently a great deal of it devolves upon the foreman.

In August of each year the foreman receives from each department an estimate of the number of boxes it will require during the next year. From these esti-

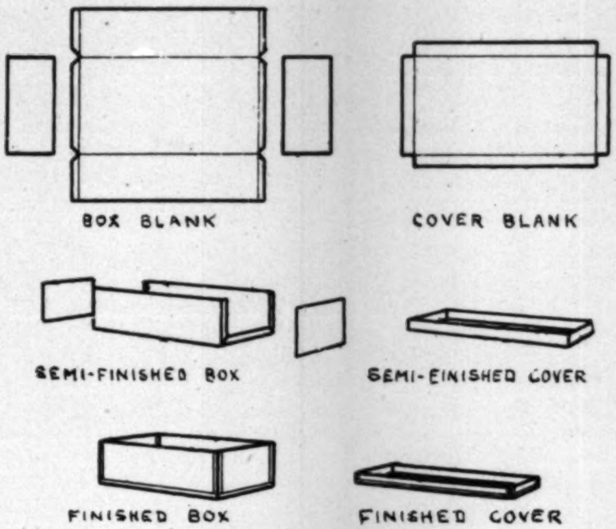


Fig. 1

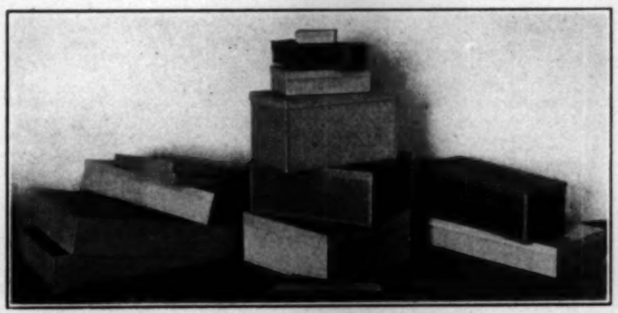


Fig. 2

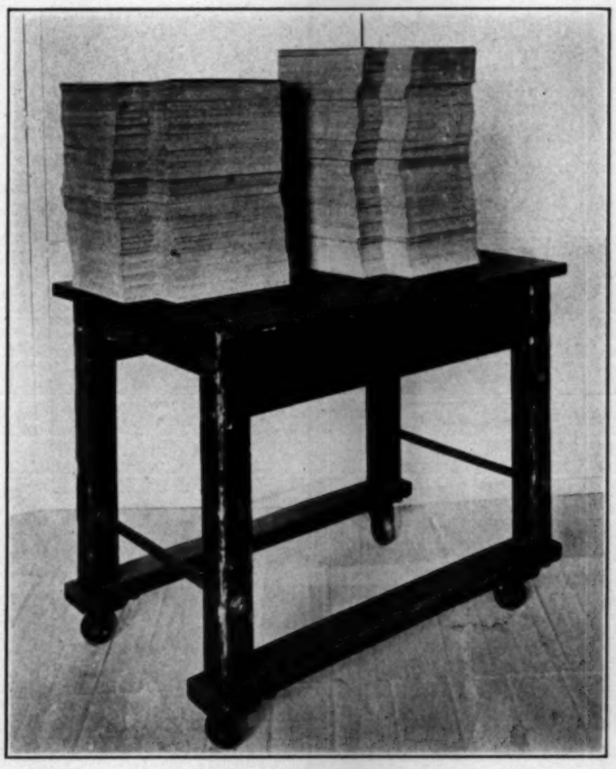


Fig. 3

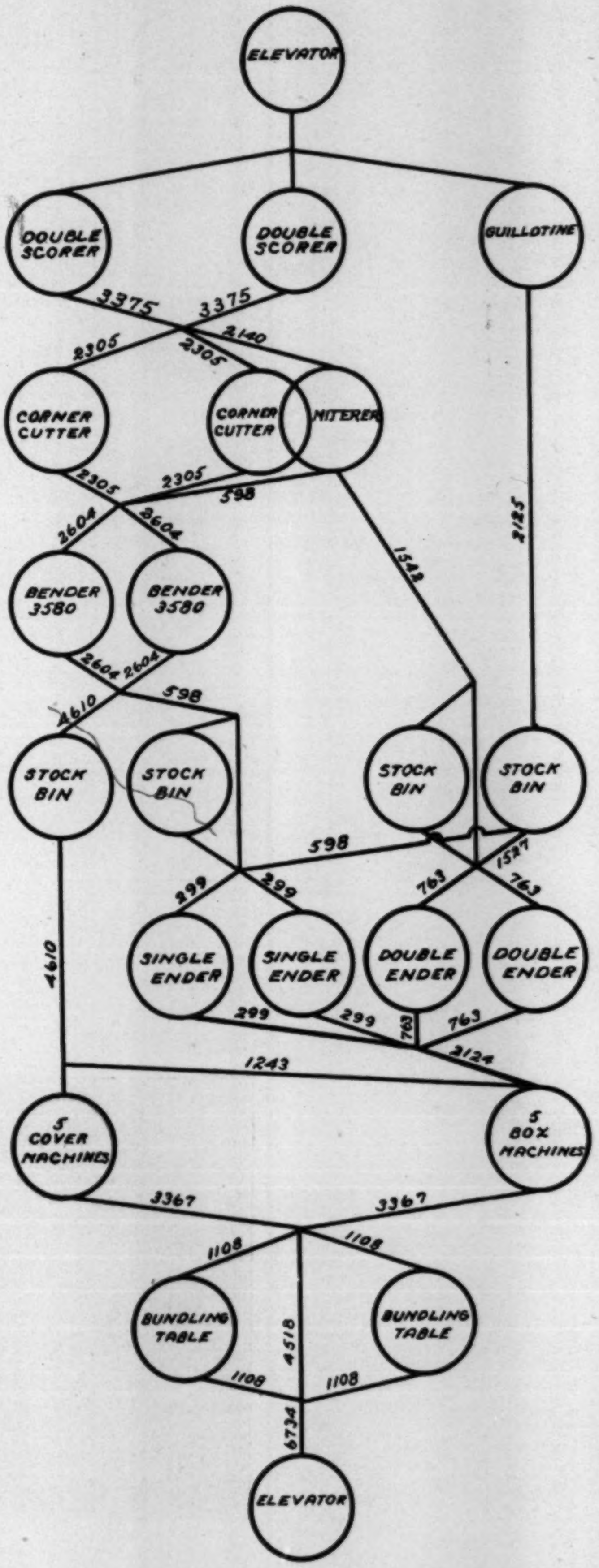
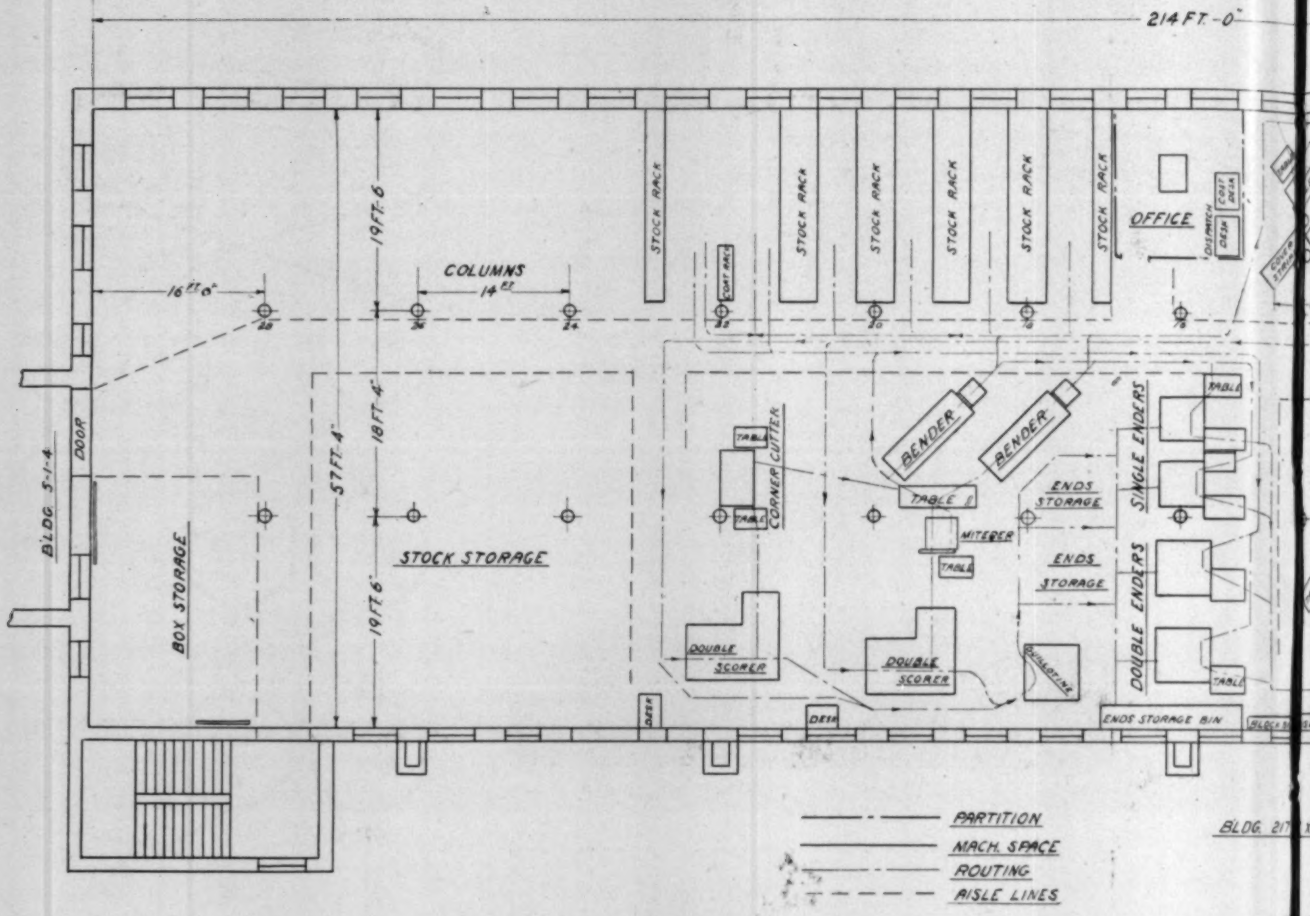


Fig. 4


214 FT.-0"
STOCK RACK
STOCK RACK
STOCK RACK
STOCK RACK
STOCK RACK
STOCK RACK
OFFICE
DISPATCH DESK
COST DESK
COAT RACK
COLUMNS
14 FT
16 FT 0"
19 FT 6
18 FT 4"
19 FT 6"
57 FT 4"
BLDG 5-1-4
DOOR
BOX STORAGE
STOCK STORAGE
CORNER CUTTER
TABLE
TABLE
BENDER
BENDER
TABLE
MITERER
TABLE
ENDS STORAGE
ENDS STORAGE
SINGLE ENDERS
DOUBLE ENDERS
TABLE
TABLE
DOUBLE SCORER
DOUBLE SCORER
GUILLOTINE
DESK
DESK
ENDS STORAGE BIN
PARTITION
MACH. SPACE
ROUTING
AISLE LINES

F. 5

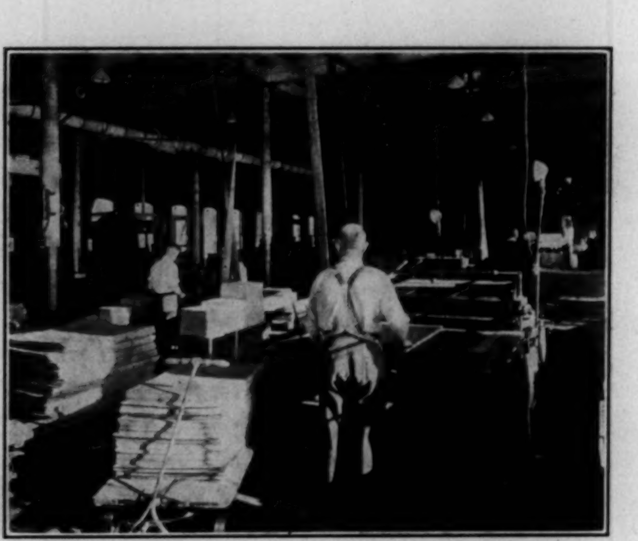
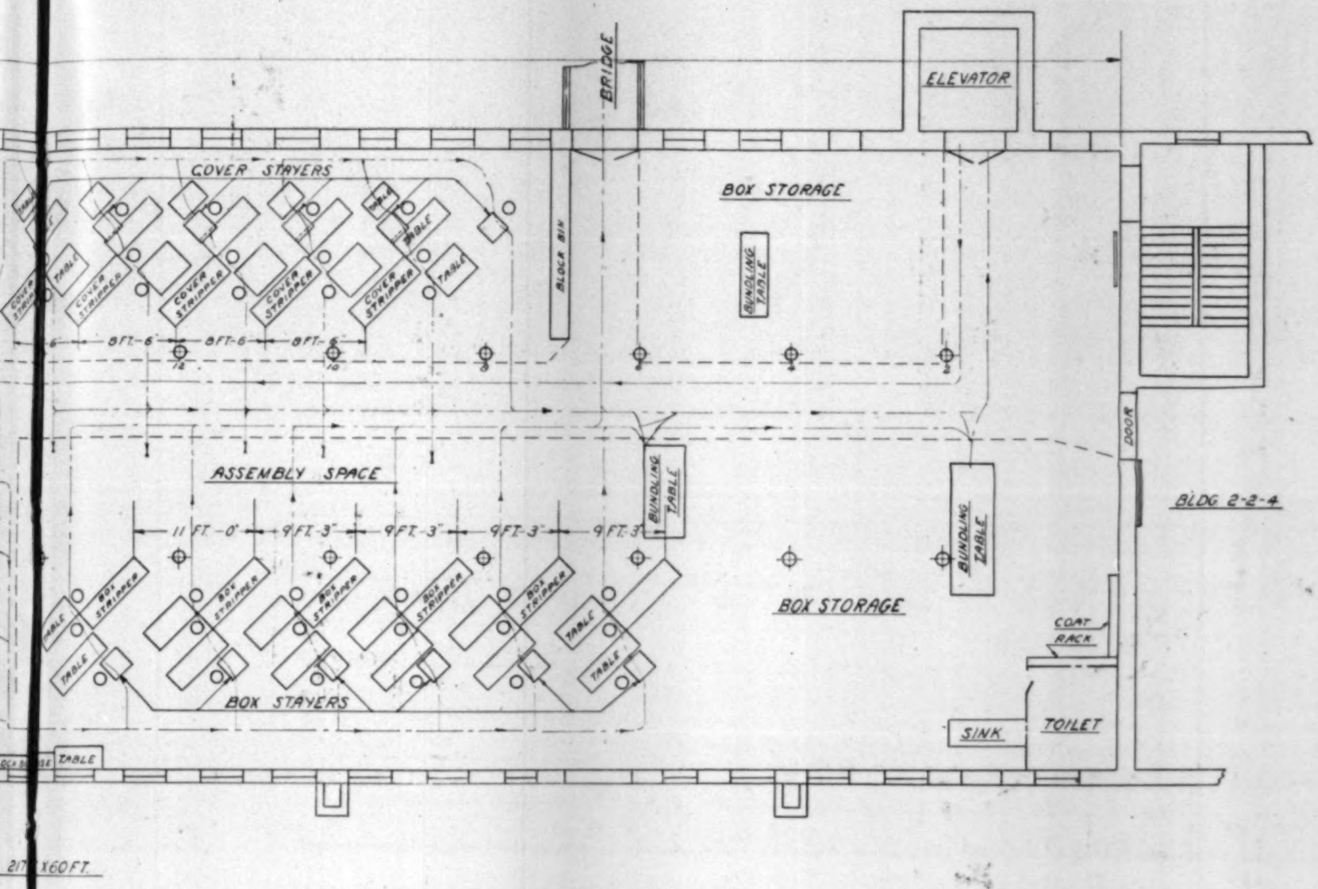


Fig 6

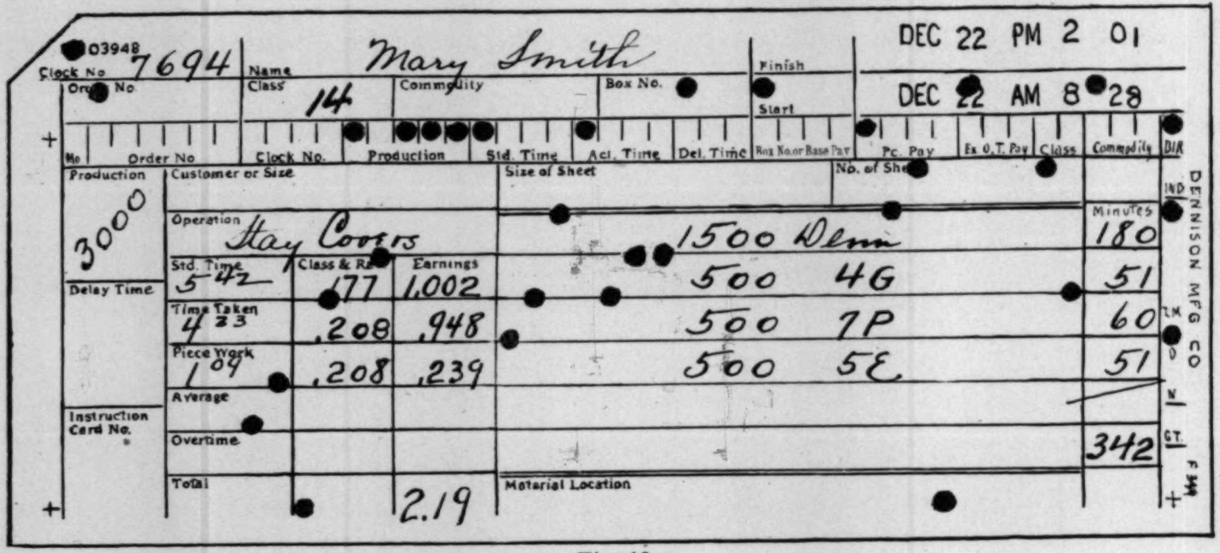

BRIDGE
ELEVATOR
COVER STAYERS
BOX STORAGE
BLOCK BIN
BUNDLING TABLE
TABLE
COVER STRIPPER
8FT-6
ASSEMBLY SPACE
BUNDLING TABLE
BUNDLING TABLE
11 FT-0"
9FT-3"
BOX STRIPPER
TABLE
BOX STORAGE
BOX STAYERS
DOOR
BLDG 2-2-4
COAT RACK
SINK
TOILET
TABLE
X60FT.

F. 5

Fig. 7

Fig. 8

Fig. 9



03948
Clock No 7694
Name Mary Smith
Order No
Class 14
Commodity
Box No.
Finish DEC 22 PM 2 01
Start DEC 22 AM 8 28
No | Order No | Clock No. | Production | Std. Time | Act. Time | Del. Time | Box No. or Base Pay | Pc. Pay | Ex O.T. Pay | Class | Commodity | DIR
Production 3000
Customer or Size
Size of Sheet
No. of Sheets
Operation Stay Covers
Delay Time
Instruction Card No.

				Minutes
Std. Time 5 42	Class & Rate .177	Earnings 1.002	1500 Denn	180
Time Taken 4 23	.208	.948	500 4G	51
Piece Work 1 04	.208	.239	500 7P	60
Average			500 5E	51
Overtime				342
Total		2.19	Material Location	

IND
I.M.
D
N
GT.
DENNISON MFG CO
F 344

Fig. 10

Fig. 11

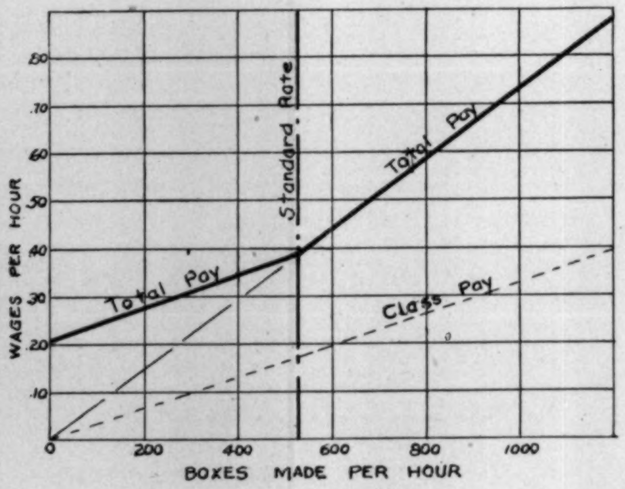


Fig. 12

mates the foreman figures the quantities of each kind and size of board which he expects to use and sends a list to the stores department. Here the estimates are compared with past withdrawals. The stores department modifies the estimates accordingly and sets its ordering points at three months' supply. When the stock on hand gets down to these quantities, the purchasing department orders more material, the quantity ordered depending upon market conditions. A store of raw material should be consequently always on hand.

At the beginning of each month the box-using departments send in their orders for the next month. The small orders may advantageously be cut in one batch and stored until needed. The large orders, however, would occupy too much floor space and would tie up too much capital if cut all at once. They should be cut in smaller batches of which the size depends on the quantity ordered. The cutting quantities for best economy are given in Table I.

CUTTING AND MAKING QUANTITIES FOR

BOX MAKING DEPARTMENT

Monthly Requirements (complete boxes)	Cutting Quantity (days supply)	Making Quantity (days supply)	Ending Machine
1,000	30	12	single
5,000	30	7	single
10,000	16	6	double
50,000	8	6	double
100,000	7	continuous	double

Table I

From the economical cutting quantities and the quantities of blanks already in stock, the foreman makes up daily lists of work to be cut on the next day. He tells the scorers what jobs to work on next and orders the newsboard for the following jobs from the storeroom. The corner cutting, mitering, and bending machines are run in series with the scorers, the blanks moving from one machine to the next either on wheel tables or by hand. After being bent the blanks are stored in spaces set aside for their type of box.

Ends for the types of boxes most often called for are cut regardless of the number of boxes on order. These are kept in bins until required, the bins being replenished whenever the stock becomes low. The operator of the guillotine knife is responsible for keeping a supply of each size of end always on hand.

The blanks are now cut and stored waiting to be made into boxes.

Every day the departments wanting boxes send in lists of the kinds and quantities which they will need on the second following day. In order to produce economically it may be advisable to make up the boxes in lots larger than those called for and hold them until needed again. The economical making quantities are also shown in Table I. From the lists of boxes needed and knowledge of economical making quantities the foreman makes up order-of-work lists, one for each ending machine, one for the battery of box-staying machines, and one for the battery of cover-staying machines. The ending-machine operators perform their work according to the order-of-work list, procuring the blanks from the locations in the stock bins. One move man holds the order-of-work list for the box stayers and another for the cover stayers. Each keeps his stayers always supplied with boxes or covers to work on and assigns the different jobs in the approximate order in which they appear on the lists. Variations may be made in order to distribute the hard and easy jobs equally among the workers. The strippers, doing their work in sequence with the stayers, require no extensive planning.

Boxes are thus produced by the direction of the foreman and are delivered to the ordering departments approximately when they are wanted.

Wage System

For payroll, cost and production records, Hollerith card job tickets (Figure 10) are used. Spaces are provided for employee's clock number, employee's name, order number, class or code number for operation, commodity or code number for style of box, box number (not used), starting time of job and finishing time of job. Further spaces are provided for number of boxes produced, customer's name or box size, depending on the kind of order, size of newsboard sheet and number of sheets required, operation, delay time and instruction card number. The columns headed std. time, class and rate, and earnings are used to figure the employee's wage, the method for which will be explained later on.

These cards are printed with a paper duplicate, the duplicate being used to procure the information from the workers and the original for the making up of records. When each worker is ready to start on a new job he turns in his old job ticket to the dispatch clerk and procures a new one inscribed with his name and clock number. The dispatch clerk stamps the time in the "Start" space on both original and duplicate tickets with an electric time stamp as shown in Figure 11. The original she places in the pocket for the worker on her dispatch board, the duplicate is given to the worker. He takes his copy and performs the operation. When he is finished, he fills in the proper spaces the kind or size of box, the operation performed, the order number, if there is one, and the number of boxes he has produced. The ticket is now returned to the dispatch clerk who time-stamps both it and the original in the "Finish" space. Stayers, strippers and rubbers down perform from one to six different jobs on the same tickets in order to save time and trouble.

The dispatch clerk now copies the information from the duplicate to the original and fills in the code numbers for the operation and the commodity. She also figures up and fills in the employee's earnings for each ticket.

For men working on the cutting and ending machines, who are paid at a straight hourly rate, this is a comparatively simple matter. The time taken for the job is quickly determined from the start and finish times with the aid of a printed card. The man's hourly rate is entered beside of the time taken and the earnings figured by multiplying the two together.

The standard time method of payment is used for all piece workers. The standard time for any job is set by the time study department as the time within which 80 per cent of the operators can do the job. As shown by Table II, the standard time varies according to the size of the box.

The piece rate used with standard time is made up of two parts, a base rate for the worker and a class rate for the job. The worker's base rate is determined by her loyalty, personality, intelligence, attendance, versatility, quality of work, and so on. The class rate is determined by the difficulty of the work. In the department we are describing all of the work is of about the same difficulty so that the same class rate is used for all jobs.

If the worker completes her job within standard time she receives in compensation for her services, the class rate for standard time, her base rate for the time taken, and her base rate for the time saved (standard time less time taken). When boiled down this means standard time multiplied by the base plus the class rate being the same as with a straight piece rate.

When the worker takes longer than standard time to finish the job, she is paid the class rate for standard time and her base rate for the time taken. This insures to the worker a certain amount of pay (i. e., her base pay) no matter how little work she does, and recognizes the fact that an employee is entitled to some remuneration for merely being present at the factory.

One may obtain a good idea of the variation of the wages according to the amount of work turned out by looking at the wage chart in Figure 12. It will be observed that the pay due to class rate varies directly according to the number of boxes produced and that the pay due to base rate is constant when the standard rate is not attained but is directly proportional to production when the standard is bettered.

Returning to the job ticket, we can now understand how it is figured out. The 5 hours and 42 minutes is standard time allowed for staying the 3,000 covers listed. The 4 hours 33 minutes is the actual time worked on this job and the 1 hour and 9 minutes is the time saved by the operator by completing the job in less than standard time. The class rate is $1.77 and the base rate $.208 an hour. The whole card figures to $2.19 and this is the amount paid to the worker.

STANDARD TIMES
Staying Boxes

Box Size	Time per Thousand
0" - 15"	86 min.
15" - 25"	100 "
25" - 30"	120 "
30" - 40"	150 "

Staying covers or Boxes not over 1-¾" deep

Box or Cover Size	Time per Thousand
0" - 15"	88 min
15" - 25"	102 "
25" - up	120 "

Box and cover sizes in the tables above are written

in united inches which include the length, width and depth combined.

Stripping Boxes or Covers - 2 girls

Perimeter plus depth	Time per Thousand
0" - 40"	104 min
40" - 54"	120 "
54" - 60"	145 "
60" - up	179 "

Stripping Cover - 1 girl

Perimeter plus depth	Time per Thousand
0" - 40"	150 min
40" - 50"	172 "
50" - up	200 "

Table II

When there is no standard time rate on a job or when an operator or the company are not mutually satisfied, the average hourly earnings are paid.

After the pay is figured out for a job ticket, the ticket is given to the department cost clerk. This clerk places the ticket in a Hollerith card punching machine and punches out the order number, clock number, production and so on. The tickets are then filed by the clock number until the end of the payroll week. At this time the cost clerk draws off the payroll, showing the total hours and pay for each clock number and the constituent hours and pay for piece work, regular work, overtime work, night work, and noon watch. The total time work as shown by the job tickets is also checked with attendance records in order to determine if any tickets are missing.

Cost Accounting

The box department receives credit for the work it does by charging the customer departments for the boxes delivered during the month. The total charges for each department go through to the Accounting Department on monthly vouchers together with a detailed list of the boxes delivered and the amount charged for them.

The amount charged for special boxes is the actual cost of the material and labor plus the overhead on the direct labor cost. The amount charged for regular boxes is fixed by the standard cost of the box, which in turn is made up of the standard material cost and the standard operation costs plus the overhead.

The standard material costs are based on the market value of the material and the amount required for the boxes. The standard operation costs represent the average costs for the operations. Cost of scoring is based on the number of sheets of board, cost for other straight time operations on number of boxes or covers, and that for piece work operations on the standard time allotted for the work. The operation costs are determined by the cost department from monthly reports submitted by the department cost clerk.

One report for the straight time workers shows on each operation the quantity of boxes turned out and the time and direct labor charge for doing it. From this the cost department figures the average number of boxes turned out per hour on each operation and the labor plus overhead cost per thousand. The rates are compared every month with those of past months and with the standard. If actual rates seem to be consistently drawing away from the standard, the reason is ascertained, if possible, and the standard changed to agree.

Similar to the method of determining the standard rates for the time operations is that used for the piece operations. The report shows for each piece operation the number of standard hours worked, the amount paid and the resultant hourly rate in dollars per standard hour. To this rate the cost department adds the overhead, obtaining an average rate per standard hour. The standard rate is set as the average of the average rates.

Every month, also, the cost department receives a detailed report of the amounts charged to customer departments for labor and overhead at standard costs. The total of these it compares with the total actual direct labor cost plus overhead as given in another report. This comparison shows whether the department is gaining or losing money relative to past performances.

Conclusion

The department which has been described is one o the more efficient in the plant. The workers keep the material flowing steadily through their machines and the piece workers complete their jobs in an average of 75 per cent of the time allowed. Within the floor space of 12,200 square feet, the forty odd employees turn out an average of 18,000 boxes a day at a cost of about 2.66 cents a box, only 1.28 cents of this being for labor and overhead. This large production and low cost does not interfere in the least with the quick average delivery to customer departments of two days.

SERVICE TO MEMBERS

WE are grateful for the following acknowledgement of a service recently rendered a member. The problem was whether a particular system of cost accounting set up for purposes of precise operating control includes a method of worked-material inventory valuation which meets the requirements of an income-tax report.

> I wish to address to you, and through you to the members of our Society, the company's appreciation of the service the Society has just rendered in compiling a questionnaire and furnishing a transcript of the replies covering a problem in income tax requirements which is engaging our attention. When the proposition of attacking our problem came before us the writer did not hesitate to offer as a possible help the Taylor Society, and hastened to address the Managing Director concerning it. I now want to express the satisfaction we have secured from such service and to place before the members of the Society the thought of the possibilities for such service to individual members. We have just the data needed as a result of our appeal to the Society and frankly only through such a society as ours could the data be gathered.
>
> This I trust you will use as a matter for publicity.

RUSSIAN SCIENTISTS IN QUEST OF AMERICAN EFFICIENCY

By S. Slonim[1]

THERE recently appeared in several newspapers of the United States a cable dispatch from Europe as follows:

> *Special Cable Dispatch*
> Copyright, 1922, by **Public Ledger Company**
>
> Berlin, Aug. 22.—The Soviets are introducing the Taylor Efficiency System in Moscow factories. The Central Workers' Institute located at Gastew employs sixty professors to teach instructors how to introduce the system into factories and the Soviets are underwriting the Institute.
>
> In addition to the efficiency methods borrowed from the United States, psychological and physiological workers tests, based on the French and German plans have been introduced.
>
> The Soviets, however, are encountering the same difficulties of the American capitalists who found the workers unwilling to be "efficiencyized" although members of the school maintain the higher class of workers support them.
>
> A considerable part of the funds for founding the efficiency system were raised in America and Herbert Hoover, through the head of the Russian department, M. Slonin, expressed interest in the plan. The school has applied to him asking for assistance to purchase instruments.

Believing that the members of the Taylor Society would be interested in an authoritative statement concerning the facts alleged in this dispatch, the editor consulted Mr. S. Slonim, at present with the American Relief Administration, and Mr. Slonim kindly prepared the statement printed below.

It appears that there is as yet no general introduction of Taylor methods in the factories of Russia, but that a central institute has been organized for the purpose of experiment, in general with respect to scientific methods in industry, and in particular with respect to Taylor methods. This institute, located in Moscow and with branches elsewhere, is not merely a research organization; it has interested factories where production operations are actually carried on, and where Taylor methods are applied in accordance with Russian interpretation of them and to the extent that limited available equipment makes experimental operations possible.

These efforts are at present crude—for want of proper equipment some experimental machines are being made of wood! But the mental attitude seems to be sound; it is scientific and its motive is the regeneration of Russian industry.

Many appeals for equipment have come to the American Relief Administration, but the nature of the assistance requested does not properly fall within the field of its operations. Mr. Slonim suggests that members of the Taylor Society may find in this situation the opportunity for a practical international cooperation; one member may have a machine he can spare, another, a stop watch, another a piece of photographic apparatus, others precision tools of one sort and another, others organization charts, sets of standing orders and forms; and so on. The value of a moderate contribution from each of a hundred firms or individuals in the United States to this fundamentally sound movement in Russia, he states, cannot be estimated. It might eventually prove to be one of these imponderables so influential in determining the course of international commercial relations. (Editor.)

FROM the wreck and ruin of the old order left by the disastrous war and revolution, a crippled and much-battered Russia is gradually emerging with a new viewpoint.

First to arise from among the ruins of old Russia, as it was natural to expect, were the scientists and engineers. It was to them that the by this time sobered-up bolshevik politician and sadly-awakened proletarian are looking for guidance—for the word of wisdom and hope.

What tragic trials the Russian men of science went through is already well known to the world and need not be repeated here.

The first indication that the creative forces of Russian scientific thought are beginning to assert themselves was when at the offices of the American Relief Administration in New York, a memorandum prepared by the "Presidium" of the Central Institute of Labor of Moscow arrived by mail from Moscow. In that somewhat lengthy document, the most characteristic parts of which are quoted below, the executive committee, or the "Presidium" of the Institute, as they call themselves, after stating their aims and aspirations, seek to engage the good offices of the A. R. A. to present the case of the Institute before the American patrons of science, in expectation that the patrons will make a "gesture worthy of the builders of the New World." (In Russia the words America and the New World are synonymous.)

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[1] Late Editor *Russian-American Journal of Commerce;* with the American Relief Administration.

According to the memorandum, the idea of establishing an Institute of Labor in Russia is quite an old one. The first attempts in that direction were made in the year 1889, when the so-called "Social Museum" was opened in Moscow, as a result of the resolution passed at the International Exhibition in Paris in 1889. But under the old czarist regime, the words *social* and *political* were synonymous, and that was sufficient for the authorities to look with suspicion upon the "Museum" as an institution with political aims.

It was natural that the Russian Revolution, by pushing the laboring class to the forefront of the social arena, by making labor the centre of social gravitation, should give also an impetus to questions of efficiency—of greater production, of social engineering. After the Revolution, during the years 1917-1920, a number of engineering and labor organizations repeatedly raised the question of the necessity or organizing an institution devoted to the study of labor in all aspects.

Only in 1920 a small group under the patronage of the "All-Russian Central Council of Professional Unions" succeeded in forming an organization, not only for the scientific study of the processes of production, but for the immediate introduction of the most efficient methods into the industries as well. The organization which undertook this thankful, but enormous and responsible task, is known in Russia as the "Central Institute of Labor." Its goal, as the leaders of the Institute express it in their memorandum, is "to implant into the character of the peoples of Eastern Europe and Siberia, the searching, daring, persisting American energy."

According to the program, as outlined by the Presidium, the work of the Institute runs along four main lines: Technical, Biological, Economical and Pedagogical. The pre-eminent line of research is technical. In this the Institute sounds a note of triumph for the instrument of precision, the machine; the victory of the stricly defined "mechanical gesture." By these means, by "mechanical onrush and relentless mechanical energy" the Institute expects to rejuvenate industrial Russia.

The Institute does not intend to confine its activities within the limits of purely research work; it wants to get into the thick of life. The Institute has already shown its influence in the biggest Russian industrial plants, in the large economic organization. In a word the Institute wants to become the standard bearer of the "culture of efficiency" in Russia; it wants to create the psychological atmosphere of stern colonizers, fighters for a healthy, able-bodied efficient generation.

The personnel of the Institute consists of men who are imbued with the ideal of European and American methods of production. They would become the proclaimers to the Russian masses of a new era of productive and remunerative labor, but—

And here we come face to face with that fateful "but," which has always played a tragical part in Russian life, whether czarist or bolshevik. The only difference between the "but" of today and the "but" of the czarist times, is that in czarist Russia they could but they wouldn't, and in bolshevik Russia they would, but they couldn't.

Czarist Russia had all the opportunities to organize institutions and laboratories and equip them with the latest devices for the study of labor productivity from both material and human points of view. But not only was the czarist Russia not interested itself in the establishment of such institutions, it looked with great suspicion upon any initiative in that direction.

On the other hand, the bolshevik government is frantically trying to raise the productivity of the country which industrially is literally devastated, but lacks the means. An institute of the calibre and aims of the Central Institute of Labor needs large means for its efficient development.[1]

Hence the cry for help addressed to America through the medium of the American Relief Administration. "We need," writes the Presidum of the Institute, "laboratories, shops, machinery and apparatus, but to our regret, we have not got them."

"We appeal to you;" runs the same memorandum, "your capital can create monuments of culture. We know that the best American institutions, laboratories. bureaus of research, universities, the best institutions of learning, have been created by your milliarders. We know that the Chicago University is the pet child of

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[1] See Appendix I, a letter which states that machines now have to be made of wood!

Rockefeller; we know that Carnegie has heaped his gold on the American Libraries, that in Pittsburgh and in Washington he founded scientific institutes, where industry and science blend into an overwhelming synthesis. . . . We know that America is covered with societies for the rationalization of the economic life, and we know that as the culmination of all this grandiose work there has appeared that super-structure, 'The Federation of American Engineering Societies,' and finally we know also that a committee has been appoint- for the study of 'Elimination of Waste in Industry.' We know that the man who is marching at the head of this triumphal procession is Herbert Hoover, he, who wants now to Americanize Europe. . . "

"We ask the American patrons of science to make the gesture worthy of the organizers of the New World, help us to start our Institute; send to us across the Atlantic a few of your technical, psycho-technical and photo-technical laboratories, present to us a few of those values which you so ably give for the development of your forever-searching energetic country."

"We will readily inscribe on each thing sent to us not only the word "America," but we will make these gifts to be memorials to the name of the Society or the individual who will thus work with us on the plowing up of the tired out Russia."

Such is the eloquent—if not the impassionate—appeal of a group of Russian scientists who are impatient to push ahead their work, from which years of revolution and privation have kept them back.

And that is why when a glimmer of light is at last beginning to penetrate the darkness which had enveloped Russia for so long a time, the soul of the Russian scientist, which was during all that time at its lowest ebb, suddenly became all a quiver and now passionately appeals to the world for a helping hand.

When in the year 1920 it became known that an institute dedicated to the study of modern methods of production was going to be opened in Moscow, tens of organizations and hundreds of professional people in Russia offered their services. But it was only on the spur of the moment. The enthusiasm aroused at first died away when it became evident that the work of building up the Institute required great sacrifices, since there were no instruments, no machinery for experimentations, no food for the workers, no fuel for heating the shops. Finally it sifted down to a group of about sixty people of the highest attainments in their respective professions. And they began to work. "It was," as the Director of the Institute, Alexsey Gasteff, wrote in one of his letters to the writer, "by sheer will power and enthusiasm that we decided to go against the elements. And where we have needed metal, we have supplanted it by wood. In this manner we created a scientific "Robinsoniada—all of its own. We made wooden models, wooden apparatus, etc. And all this in the hope that the day will come when our wood will be transformed into metal."

As outlined in the program, the work of the Institute was planned on a broad scale worthy of an endowment by a Rockefeller or a Carnegie foundation, but as it stands today there is "little powder in the magazine."

The Institute consists of six laboratories:

1. Cinematographic.
2. Technical.
3. Bio-Technical (mechanics of work movement).
4. Physio-Technical (energy of the working body).
5. Psychotechnical (psychology of the workmen).
6. Pedagogical (the study of work discipline).

And at the top of all—the study of methods for scientific organization and management of various undertakings (Chart I).

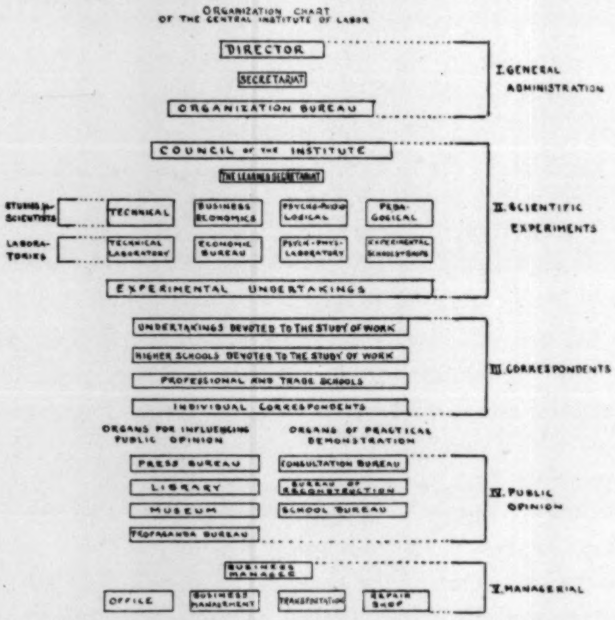

Chart I

Exact graphical reproduction of Russian original

Notwithstanding the almost insurmountable difficulties which the Institute had to overcome during the short two years of its existance, it has succeeded in founding a publication, "Organization of Labor," which would do honor to any society of the same kind in any civilized country. Already three issues of about 200 pages each have appeared. Besides this publication, which is the official organ of the Institute, there have been published a number of text-books and monographs, pertaining to a number of diverse subjects on labor efficiency. It may be of interest to the American reader to get a glimpse of the contents of this official organ of the Institute. In the first number of the publication appear such articles as: "Our Problems," by A. K. Gasteff; "Fundamental Principles of the Management of Undertakings," by A. L. Fest; "Concerning the Taylor System," by M. V. Pionlukovsky; "Concerning the Question of Classification of Labor," by C. G. Strumilin; "The Study of Work Movements by the Method of Ciclograms." The bibliographical part of the organ glitters with exhaustive reviews of kindred foreign literature, among which the American literature on the subject occupies the first place.

Since the war America occupies the uppermost place in the Russian mind. American progress in a remarkably short time; her ingenuity, initiative, daring; the enormous sweep of her undertakings; these fire the imagination not only of the average Russian, but of its politicians and scientists as well. That ardent desire of every Russian to see as quickly as possible the come-back—the material reconstruction of Russia—inevitably forces the attention of all Russia upon America. Of all the countries in the world Russia understands that it is from there that some day in the near future the men and the means will come, who will lead Russia out of the wilderness of desolation. The names of Taylor and his American followers in questions of industry and production stand today on the same plane of authority in Russia as the name of Lenine in the world of Russian politics.

APPENDIX A

Central Institute of Labor

Moscow, 16th May, 1922.

Dear Citizen Slonim!

Your touching letter received with the proposition "frankly inform about needs" of our institution, we have resolved to address to you with a request—to help us in arranging our laboratories, our model workshops and museum.

Till now we lived in the hope on that internal potency, by which our active fellow-laborers were infected. So far without any essential aid for developing our business we have decided to prepare all equipments by our own hands and out of material, which was on the place, which yet remained in our ruined country.

With a greatest effort, but we have laid the foundations of our six laboratories: No. 1, a photo-cinema; No. 2, Technical—technical-working methods; No. 3, bio-mechanical—mechanics of the human labor gesture; No. 4, physico-technical, energetics of the working organism; No. 5, psycho-technical, a psychology of the working man; No. 6, pedagogical investigation of labor training. At the beginning is the arrangement of the laboratory of social engineering; its problem is to work out laws of the shop organization and management.

Laboratory equipments are prepared by the fellow-laborers and workers of our modest workshops themselves. By the frame of mind, by the will we decided to go in despite of elements. And where a metal is necessary, we have used a wood and created an original "robinsonade." We have made wooden patterns, wooden apparatus, appliances. And all this in the hope, it will come a day, when our wood will be transformed in the metal.

At present we are going out on the high road. We are organizing courses of managers, bosses. We are going in the middle of life, in enterprises, shops, factories. The faith in future, the faith in sound instincts of the nation, in the new epoch of the labor rationalism—is our fire-tower.

Your answer to the call was a new sign for the work.

And we are deciding to address to you with a request to give us such a help, which will be for us the most essential.

Give us a help by sending technical appliances, such one, which we cannot find at us.

In conformity with this we send to you a list of machines and apparatus.

We believe . . . . .

In advance we decided to name these appliances, if you permit, by two words "Hoover-Slonim."

From all fellow-laborers of C. L. I. we send you through the whole continent and ocean our great, great thank.

The Director of the Central Labor Institute:
GASTAEFF.
Presidium:
KEKCHAIEV.
PIOLUNKOWSKY.
CHLEBNIKOV.

FOREIGN APPRAISAL OF THE BULLETIN

IN a letter from a well-known Italian concern, ordering a two-year subscription to the BULLETIN after they had purchased such back numbers as are available, we find the following paragraph:

> We have read with the utmost interest all the BULLETINS received from the first to the last word, and we judge the contents of more value than the matter contained in many similar American and English publications.

A letter from an English concern, frequently cited as an example *par excellence* of efficient management and fine industrial relations, contains the following:

> We observe that (certain numbers) are out of print. We place such a high value on your BULLETIN that we should be prepared to pay a higher price for them if you would secure them from any other source.

The following numbers of the BULLETIN are out of print; has any member copies which he would be willing to turn back to the Society?—Vol. I, Nos 1, 2, 4, 6; Vol. II, Nos. 1, 3; Vol. III, Nos. 1, 2, 3, 6; Vol. IV, Nos. 1, 3, 5; Vol. V, Nos. 1, 6.

A FURTHER CONSIDERATION OF THE REPORT OF THE COMMITTEE ON ELIMINATION OF WASTE IN INDUSTRY

By THOMAS W. MITCHELL[1]

AT the December, 1921 meeting of the Taylor Society, a session was devoted to discussion of the report of the Hoover Committee on Elimination of Waste in Industry. This discussion was printed in Vol. VII, No. 2 (April, 1922) of the BULLETIN. Shortly after the meeting the following letter was received from a prominent member of the Society.

> By the way, at the Taylor Society meeting the other night I was a good deal stirred up by that report on Waste in Industry. It seems to me the most grotesque, unfair and unsound report that I have ever seen given out over the signatures of respectable gentlemen. I don't mean to compare it with the reports of a blather-skiting nature, but because it is throughout in dignified and gentlemanly tone it seems to me far more dangerous. Several things about it impress me particularly:
>
> 1. The effort to appraise entire industries from such ridiculously inadequate samples.
> 2. Basing appraisals on examination of things so indefinite as "textile manufacturing." I take it there was quite as much difference between the types of textile manufacturing in plants in regard to the subject matter of this report as there is between many fundamental industries.
> 3. The adoption of an effort to make a quantitive analysis of waste which seems to me absurd on its face. The refinement of absurdity is reached when this effort for quantitive analysis is carried to two points of decimal.
> 4. The effort to apportion the responsibility for this quantitive analysis between management, labor and all other causes, this apportionment being on a different basis.
> 5. The spreading broadcast of a statement that over fifty per cent. of the responsibility for waste is on the manager and twenty-five per cent. on labor with no differentiation whatever (even assuming the correctness of percentages which cannot by any possibility be definitely determined) between waste caused by the inefficiency of managers who are as a class doing their level best to accomplish results and waste caused by labor which is very largely due to improper motivation.
> 6. The grotesque failure of this group of engineers to realize and lay any stress on the time element in correcting waste. From a reading of the report one would get the idea that these things for which management is responsible should be corrected immediately a statement entirely comparable to the statement which Mr. Brandeis extracted from Mr. Taylor in that railroad investigation some years ago in which the statement went out that one million dollars a day could be saved by the railroads without Mr. Taylor's being given any opportunity to state that it would take from five to ten years for anyone with carte blanche to realize the necessary economies.
> 7. My reason for sending you this screed is that so far as I can see this report is substantially a Taylor Society report and I wonder if it does not indicate that the whole crowd of Taylor Society people are fundamentally about as far away from Mr. Taylor's own point of view as it is possible to get. Personally I cannot conceive of Mr. Taylor's ever putting out such a ridiculous, unscientific, inadequate and absurd report as this seems to be. How do you feel about it?

A copy of this letter was sent to Thomas W. Mitchell, who had participated in the investigation of the Hoover Committee, and Mr. Mitchell prepared the following reply:

The Committee on Elimination of Waste in Industry labor under no illusion that their report is one hundred per cent accurate quantitatively. Indeed, the report explicitly states (page 4) that because of the manifest impossibility of adequately covering nearly 300,000 plants in five months, the nature of the study is to be "compared in point of view to that of a reconnoitering party for a proposed railway, or to the preliminary assay of a mine, or to the first pencil drawings of the design of a new machine. The object in each case is to disclose the main phases of the project, which may then be developed and perfected by the engineers, through further study and elaboration, in whatever detail may be required."

Furthermore, your friend's impression that the Committee placed great reliance upon the valuations yielded by the Field Report Evaluation Sheets is mistaken. We do consider the questionnaire and evaluation sheets to constitute the most valuable product of the assay; not, however, because we consider the questionnaire to be anywhere nearly perfect or the relative valuations assigned the forty-odd factors on the evaluation sheet to be even approximately accurate. Of the reports on individual industries, only one (the Textile, pp. 240 et seq.) either is based extensively on the Field Report Evaluations or even gives them more than passing mention; in most cases they were merely appended to the engineer's report without comment. The Committee's feeling is fairly well expressed by Mr. M. L. Cooke (Men's Ready-Made Clothing Industry, p. 118): "We are fairly well satisfied," he said, "that our evaluation sets forth the *comparative* wastefulness of the nine plants with substantial accuracy. However, it is evident that a considerable element of judgment enters into our relative evaluations of the forty-seven items and that until these judgments can be tested and rectified in the light of later experience, too much reliance should not be put upon the absolute accuracy of the several evaluations. We feel that the chief value of this field report evaluation sheet is to be found not in the results of this investigation, but in that it *constitutes* an important *beginning* out of which will be perfected a very powerful and very valuable instrument for investigation. Later experience will of course suggest other causes of waste than those we have enumerated. It will give us more accurate measurements of the waste-producing powers of the various causes than is possible now." I may add on my own account that I find the questionnaire, irrespective of the field report evaluation sheet, a very excellent guide in making a preliminary survey of a plant on the basis of which to develop the major plan for the development of scientific management. A major defect of the field report evaluation sheet I shall point out later.

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[1] Industrial Engineer, Philadelphia.

In your friend's third objection, he thinks it absurd to attempt a "quantitative analysis of waste." The meaning of his expression is not clear. Possibly he means quantitative measurement of the *whole waste* in a plant, possibly the quantitative *distribution* of this whole among its causes. In either interpretation, it should not be difficult to convince him that he is mistaken, provided that he thoroughly understands the significance of a scientifically determined performance standard. To illustrate, I shall interpret the data charted on page 109.

The standard time for creasing an arm-hole seam by the best method found in use among eleven "finish pressers" is 0.295 minutes; for pressing a sack coat shoulder, 0.315 minutes. These standards were ascertained by painstaking elementary time study and include the fatigue and variation allowance as per Carl Barth's and Dwight Merrick's formula. In creasing arm-hole seams, however, operative A regularly averaged 1.02 minutes, B 0.58 minutes, etc.; or the eleven operatives together were producing at the composite rate of 626.8 armhole seams per hour as against the standard of 2233 (See Appendix A, totals of columns 3 and 1); they were averaging but 28 per cent of the possible output, i.e., this operation was but 28 per cent efficient, or there was a waste of 72 per cent of the possible rate of output. In like manner the eleven operatives were pressing an average of only 844.6 shoulders per hour (when on that work) or only 40.3 per cent of the possible hourly rate of 2095 shoulders per hour. There is a waste of 59.7 per cent of the possible rate of output in this operation.

Thus by carefully determining a performance standard for each operation and then recording actual performance and comparing it with the standards, the average efficiencies of operation and their complements, the wastes, can be measured. Appendix B shows how the average efficiency of any specific operative, of any group of operatives, of a whole factory, can be measured by comparing the recorded time actually taken on completed "jobs" during any specified week, month or other period, with the standard time for the same "jobs." By the same process the average efficiency of two or more plants, of a whole industry, can be measured. Only two things are requisite: viz., (1) a scientific determination of a standard rate of performance for each operation; (2) a record of all "jobs" or specific work assignments completed by each operative, together with (a) the standard time, and (b) the time actually taken on each.

So much for the measurement of the *whole waste* of operation when the operatives are working. If this is supplemented by "wait tickets," one of which is given to a workman whenever he has to lose time while waiting for work, waiting for tools, waiting for his machine to be repaired, and the like, the loss of operative-capacity through such delays and interruptions can be measured and even separated by causes. The sum total of man-hours consumed during a given week by operatives as recorded on their work tickets is also the sum total of work-place hours operated by work-places (except in case of multiple-unit machines, which cases can easily be handled). Comparison of this with the total full time for all work-places, gives the loss of work-place time or loss of potential plant capacity through idleness of work-places, whatever the *cause* of such idleness may be. This record might be made *positive* and the idleness classified and measured by causes—absenteeism, sickness, accident, labor turnover, breakdown, etc., etc.—by providing an "idle time ticket" for each work-place when it is idle. Thus the whole waste of potential capacity can be measured separately as various idleness wastes and waste resulting from operatives failing to attain standards.

However, the latter waste may be due to any one or more of a number of causes; viz., (1) various operations may contain unnecessary work ;(2) the appliances furnished or used may be inferior to the best existing apparatus for the purpose; (3) the appliances may not be in proper operating condition, or there may be other hampering operating conditions; (4) the method used by some or all of the operatives may be inferior to the best known methods; (5) some or all of the operatives may be withholding attention and effort.

A performance standard, to be valid, must always refer to a specified work content, performed by a specified method, with specified conditions as to operating space, light and the like. The *best* performance standard refers to merely necessary work content, the best known appliances for the purpose, the best operating conditions and the best known method. However, given *any* specified work content, specified appliances, specified conditions and specified method, a valid performance standard can be determined for that combination. The determination is by elementary time study. It is by comparison of the standards for such combinations that the *best* combination and best performance standard can be determined. Furthermore, a comparison of these standards of various combinations will measure the comparative efficiency of various alternative appliances, various alternative methods and the like.

To illustrate, our eleven operatives were not all using the same method either of creasing armhole seams or of pressing shoulders. B and L were creasing armhole seams by a method which careful time study showed should consume 0.295 minutes per armhole seam; D's method should consume 0.52 minutes, F's, 0.53 minutes, that of A, E, and N, 0.58 minutes, while that of C, K and O should consume 0.815 minutes. At these various rates the combined output per hour of the eleven men should be 1255.5 armhole seams as against 2,233 if all used the quickest of these methods. In other words the average efficiency of the methods used was only 56.2 per cent. But compared with the 1255.5 units per hour they *should* have produced even by their various methods, they actually produced only at the composite rate of 626.8 seams per hour; their application of effort averaged only 50 per cent of what they were capable.

Thus the 28 per cent efficiency with which this operation was being performed is explained by the fact that the methods used were, on the average, only 56.2 per cent effective and the operatives themselves were only 50 per cent effective in effort and attention. The product (0.562 x 0.50) gives the 0.28 or 28 per cent efficiency.

The 72 per cent of waste in the performance of these two operations is to be divided between inferiority of methods and deficient application of operatives, in proportion to the arithmetic complements of these two efficiency percentages. Thus, the complement of 56.2 per cent is 43.8 per cent (a waste percentage); of 50 per cent is 50 per cent. Dividing 72 in proportion, we get 33.6 per cent waste assigned to inferior methods and 38.4 per cent to deficient application; thus

	Waste Factors Per Cent	Waste Distribution Per Cent
Inferior Methods	43.8	33.6
Deficient Application	50.0	38.4
	93.8	72.0

In like manner the efficiency of method in pressing shoulders averaged 68.9 per cent and of operatives' application 58.5 per cent (See Appendix A). The waste factors corresponding to these are 31.1 and 41.5 per cent respectively. Dividing the 59.7 per cent of waste proportionately, we assign 25.6 per cent of waste to inferior methods and 34.1 per cent waste to deficient application.

These two operations, which are really parts of a larger operation called "finish pressing" were held *necessary* to produce the quality of product required by the manufacturer. The several operators were performing various sections of work that were determined to be unnecessary. The time averaged on all these was found to be about 45 per cent of all the time averaged on the whole operation.

The above mentioned standards referred to certain specified appliances and specified conditions which were uniform for all the operatives. We did not go into the question of whether these were the best for the purposes, although we migh very well have done so. However, the above is sufficient to illustrate the measurement of waste by causes.

While it is possible to measure waste both as a whole and with reference to each cause by application of the above described methods, this was not done, to any great extent at least, in the waste-in-industry investigation. Time and money would not permit even if employers and employees had been willing. The data used in the foregoing illustration was gathered by myself and assistants while I was Consulting Production Engineer for the Clothing Manufacturers' Association of New York. For purpose of a quick assay a much shorter method had to be devised—a method that measured *by interpreting signs* rather than by comparing actual with standard performance. Hence the questionnaire and the field report evaluation sheet. However, the engineers lacked faith in the accuracy of the measurements afforded by the latter, and for the most part relegated them to the position of appendices.

This does not mean, however, that no measurements were made. The writer made free use of the measurements made by himself and assistants during eighteen months work in the clothing industry. Mr. Sanford Thompson has spent a quarter of a century applying scientific management to building construction and has collected and tabulated such a mass of standard data, that from the mere specifications and the record of man-hours put in on a given construction proposition he should be able to make a reasonably accurate measurement of the percentage of wasted time. Mr. John Williams had spent years doing the same thing in the printing industry. Indeed, every engineer brought to his assay a mass of experience in his industry such that the fresh observation of nine or thirteen or seventy-three plants was largely a matter of checking up to ascertain whether conditions still were what they had been.

This is in part the answer to your friend's criticisms as to the inadequacy of the investigations. For my own part, I have observed literally scores of cutting departments, inside shops and contracting shops in New York City and most of the *large* plants in Baltimore, Chicago, Cleveland and Rochester. I know that the description of conditions in the clothing plants is correct. My associate's description of conditions and methods in Boston plants agree with my own observations 100 per cent. Although I am not very well acquainted with the other investigators, I know enough about Mr. Thompson and Mr. Williams to believe implicitly that they have given fair pictures of their industries.

Your friend interprets the assignment of "points waste" to two decimal places as an unwarranted pretense at fine accuracy. It is not really so. It is the product of dividing 100 per cent unequally among 47 items and then applying to these results as bases, the agreed on percentages of 20 per cent for "good," 40 per cent for "fair," and so on. Appendix C reproduces the working sheet on which Mr. Cooke, Mr. Carlin and I arrived at our final determination of "Assigned Points." If your friend will go over this and the accompanying explanation carefully he will see the appearance of pretension to fine accuracy was unintentional and unavoidable.

Your friend *missed* the *real* defect of the field work evaluation sheet. This defect is as follows: The "assigned points" sum to 100 per cent, which is not 100 per cent of the possible waste. What part of the possible product this is, whether 100 per cent or 1 per cent, is not stated. Hence to say that the average waste percentage for clothing plants is 64 per cent (p. 119), is not equivalent to saying that they lose 64 per cent of their possible product, but that they lose 64 per cent of what they *can* lose. "Assigned points" in this form will show very well the *relative* importance in a specific plant or industry of organization defects, utilization defects, and technical defects, and of the various factors within each class, and may, therefore, constitute a valuable guide to sequence in which various improvement steps should be taken. However, for the purpose of measuring waste there should be substituted a set of maximum waste factors. (See App. C.)

Now as to your friend's criticism of the division of responsibility between management, labor and outside contacts. Who but management is responsible—

(1) if a business is not provided with an up-to-date organization Chart (K1) (See p. 119);

(2) for the form of organization—functional or by individuals (K 2);

(3) for lack of specific definition of function or fields (K x);

(4) for failure to standardize operations as to work content and methods (T 8);

(5) for failure to determine proper performance standards (U 19);

(6) for failure to properly instruct workers in quality and best methods (K 7⅓);

(7) for failure to provide the best equipment as standard in each operation (T 4 and T 6);

(8) for failure to maintain this equipment in proper operating condition (T 5);

(9) for that lack of planning and shop administration that lets operatives run out of work (U 5); and so on.

Perhaps your friend cannot see why any part of the waste due to faulty organization should be assessed against labor and outside contacts (See K 2, p. 120). I didn't see it myself until Mr. Cooke pointed out that it is one thing to properly define and assign functions and another to get work people (who know or like one executive better than another) or the outsider (who always wants to see the *owner*) to take a matter to the right functionary. However, if your friend will fill out the questionnaire for his own business, make up an evaluation sheet, and go systematically and painstakingly down the 47 items and assign responsibility on the basis of (1) opportunity for initiative, and (2) opportunity for cooperation or obstruction, I venture the opinion that his individual results will sum not far differently from the engineers'.

I regret that this is not confined to two pages. In trying to make the thing intelligible I have run to ten. I hope, however, that I have furnished your friend a foundation on which to build a revision of his estimate of the Waste-in-Industry Report.

APPENDIX A

Expression of the Data in the charts, p. 109, Waste in Industry, in the Form of Hourly Production Rates, Efficiency of Operation, Efficiency of Method and Efficiency of Application.

	Standard No. of Units per Hr. Best Method	Standard No. of Units per Hr. Method used	Av. No. of Units per Hr. Produced	Eff. of Method Used 1 ÷ 2	Av. Eff. of Op Refered to Best Method 1 ÷ 3	Av. Eff. of Op Refered to Own Method 2 ÷ 3	Standard No. of Units per Hr. Best Method	Standard No. of Units per Hr. Produced.	Av. No. of Units per Hr. Produced.	Eff. of Method Used 1 ÷ 2	Av. Eff. of Op Refered to Best Method 1 ÷ 3	Av. Eff. of Op Refered to Own Method 2 ÷ 3
	1	2	3				1	2	3			
				%	%	%				%	%	%
A	203	105	58.8	51.7	28.9	56.0	190.5	130.5	84.6	68.5	44.4	64.8
B	203	203	103.5	100.	51.0	51.0	190.5	130.5	79.0	68.5	41.8	60.5
C	203	73.6	29.7	36.2	14.6	40.4	190.5	96.8	56.1	50.8	29.5	58.0
D	203	115	57.7	56.6	28.4	50.2	190.5	190.5	90.9	100.0	47.7	47.7
E	203	105	55.6	51.7	27.4	52.9	190.5	74.0	56.1	38.8	29.5	75.8
F	203	113	54	55.7	26.6	47.8	190.5	130.5	70.6	68.5	37.1	54.0
K	203	73.6	43.8	36.2	21.6	59.5	190.5	74.0	40.8	38.8	21.4	55.1
L	203	203	69.0	100.	34.0	34.0	190.5	105.2	53.6	55.2	28.1	51.0
M	203	85.7	43.8	42.2	21.6	51.1	190.5	190.5	87.2	100.0	45.8	45.8
N	203	105	56.6	51.7	27.8	53.9	190.5	130.5	95.2	68.5	50.0	73.0
O	203	73.6	54.3	42.2	26.7	73.8	190.5	190.5	130.5	100.0	68.5	68.5
	2233	1255.5	626.8	56.2 Av.	28. Av.	50. Av.	2095.5	1443.5	844.6	68.9 Av.	40.3 Av.	58.5 Av.

APPENDIX B

METHOD OF MEASURING OPERATING EFFICIENCY

This can be brought out best by an illustration. In one of my jobs I determined by careful elementary and overall time studies that with a Union Special Overlock Stitch sewing machine, maintained in a certain specified adjustment, cleaned and oiled three times per ten hours, speeded at 2,825 stitches per minute and making twenty-four stitches per inch, with a certain specified width, depth and height of machine table and of work holder, with certain specified thickness and tensile strength of thread, furnished on cones of a certain specified yardage and with the skilled use of a certain minutely specified method of feeding in, guiding and handling a handkerchief, 10.1 hours was the shortest time in which a skilled operative could be expected to hemstitch one hundred dozen twelve inch by twelve inch handkerchiefs; the corresponding standard time for one hundred dozen nine inch by nine inch handkerchiefs was 7.8 hours, and so on. A certain mathematical formula gave the standard time for any number of handkerchiefs of any dimensions.

If now an operative stitches one hundred dozen twelve inch by twelve inch handkerchiefs in exactly 10.1 hours, obviously she has come up to standard or is one hundred per cent efficient on that one assignment. However, if she takes 11.2 hours then she has delivered only 10.1/11.2 or ninety per cent of the standard amount of work in that time: she is only ninety per cent efficient on that one assignment; there is a waste of ten per cent of the capacity of this operative together with her equipment and work-space.

Now suppose that during a given week of fifty-four hours, this operative *completes* six "jobs" on which the standard time and the consumed time are as follows:

	Standard Time	Time Taken
1st	10.1 hrs.	11.2 hrs.
2nd	10.1 "	10.1 "
3rd	9.7 "	10.0 "
4th	9.7 "	9.7 "
5th	7.8 "	7.8 "
6th	7.8 "	7.8 "
Total	55.2 "	56.6 "

Then in 56.6 actual work hours she has delivered 55.2 standard hours of work. The quotient, 55.2 ÷ 56.6, is 0.975 or 97.5 per cent. Her average efficiency on these six completed jobs is 97.5 per cent.

One of these jobs was evidently commenced Friday or Saturday of the preceding week, thus accounting for 56.6 hours on jobs finished in a fifty-four hour week.

Observe that this operative has not been confined to twelve inch by twelve inch handkerchiefs. Yet by stating every job in terms of *two aspects*, (1) standard time, (2) time taken, we have reduced these jobs of somewhat varying character to a common denominator, are able to add them and measure the operative's average efficiency. As a matter of fact these six jobs need not all be hemstitching; some might have been folding, some ribboning, yet we could have measured the operative's average efficiency for the week on this basis of completed jobs.

Let us enlarge our view to take in *ten* hemstitchers. Their records on jobs completed during this week are as follows:

Operative	Total Standard Time	Total Time Taken	Individual Efficiency Per Cent
A	52.8 hrs.	52.8 hrs.	100
B	53.5 "	53.5 "	100
C	54.9 "	55.5 "	99
D	55.2 "	56.6 "	97.5
E	54.3 "	55.8 "	97.4
F	52.0 "	53.9 "	96.5
G	50. "	53.4 "	93.6
H	48.7 "	52.7 "	92.4
J	48.0 "	53.1 "	90.4
K	22.8 "	25.9 "	88.0
Total	491.8 "	513.2 "	96.0 Ave.

Here the ten operatives have delivered 491.8 standard hours of work in 513.2 actual hours or ninety-six per cent. Thus while individual efficiency ranges from one hundred per cent down to eighty-eight per cent, we are able to combine them into an average efficiency for the group. The same process could be applied to a whole department. Observe also that operative K has been working for only a part of the week, yet we measure the average group efficiency.

Suppose that the totals for the various departments for the given week are as follows:

Dept.	Total Standard Time	Total Time Taken	Average Efficiency Per Cent
Hemstitch	4,918 hrs.	5,132 hrs.	96
Embroidery	7,500 "	7,648 "	98
Ironing	564 "	594 "	95
Folding	3,500 "	3,725 "	94
Ribboning	2,350 "	2,375 "	99
Box Making	1,013 "	1,350 "	75
	19,845 "	20,824 "	95.3 Ave.

Here the operatives of six different departments have together delivered 19,845 standard hours of work in 20,824 actual hours or 95.3 per cent of the standard. The work of the six departments is all different. Yet we measure the average efficiency of all the operatives of the factory.

If any person objects to adding an hour of hemstitching to hour of box making or of embroidering on the ground that they are of *different values,* he can still measure the average efficiency of all operatives by converting both the standard time and the time taken in each department into their values. For most persons, however, the hour-comparison will be fully satisfying.

The above merely measures the efficiency of operatives. Time lost through machine breakdowns, being out of work and the like is recorded on separate "wait-time" cards.

In the above illustration workplaces have also worked 20,824 hours. Suppose that the factory contains 460 workplaces.

If each of these were in operation the full fifty hours (as recorded on operative's time cards for jobs) their total would be 24,840 workplace hours. Only 20,824 are accounted for in productive work. Utilization of workplace capacity has been only eighty per cent. With suitable records this can be allocated to breakdowns, running out of work, absenteeism, shop meetings, stoppages, accidents, labor turnover, labor shortage and the like.

If only eighty per cent of workplace time is used and the use of that eighty per cent is only 95.3 per cent efficiency, evidently the efficiency of operation of the whole factory is only 95.3 per cent of eighty per cent or 76.24 per cent.

APPENDIX C

WORKING SHEET MAKING PASSAGE FROM MAXIMUM WASTE FACTORS TO "ASSIGNED POINTS"

	Waste Factor Per cent	Pre-lim "Assigned Points"	"Assigned Points"
K 1	1.1	0.44	0.5
2	7.0	3.14	3.1
3	2.0	0.89	0.9
4	2.9	1.33	1.3
5	5.0	2.21	2.2
6	0.7	0.27	0.3
7	14.9	6.64	6.6
7-1/3	16.0	7.08	7.1
7-2/3	6.1	2.66	2.7
8	----	----	----
9	----	----	----
10	2.0	0.89	0.9
11	0.7	0.27	0.3
12	0.7	0.27	0.3
13	9.9	4.43	4.4
14	2.0	0.89	0.9
15)	2.0	0.89	0.9
16) 17)	0.9	0.44	0.4
18	0.9	0.44	0.4
19	2.5	1.11	1.1
20	0.9	0.44	0.4
21	2.0	0.89	0.9
Total	80.2	35.62	35.6

	Waste Factor Per Cent	Pre-lim "Assigned Points"	"Assigned Points"
T 1	2.9	1.33	1.3
2	5.0	2.21	2.2
3	0.7	0.35	0.3
4	9.9	4.43	4.4
5	9.0	3.98	4.0
6	2.0	0.89	0.9
7	18.5	8.18	8.2
8	16.0	7.06	7.1
	64.0	28.43	28.4

Summary

K	80.2	35.6%
T	64.0	28.4
U	81.2	36.0
Total	225.4	100.0%

	Waste Factor Per Cent	Pre-lim "Assigned Points"	"Assigned Points"
U 1	1.6	0.66	0.7
2	18.5	8.19	8.2
3	0.9	0.44	0.4
4	9.0	3.98	4.0
5	5.0	2.21	2.2
6	4.1	1.77	1.8
7	5.0	2.21	2.2
8	0.9	0.44	0.4
9	0.7	0.27	0.3
10	----	----	----
11	3.4	1.55	1.5
12	9.0	3.98	4.0
13	2.0	0.89	0.9
14	5.0	2.21	2.2
15	1.6	0.66	0.7
16	3.4	1.55	1.5
17	0.5	0.22	0.2
18	0.9	0.44	0.4
19	9.7	4.27	4.3
	81.2	35.94	35.9

The starting point here consists of the columns headed "waste factor per cent." The valuation, 16.0 placed on K 7-1/3 has this meaning: if all the other forty-five items of mechanism were present and functioning as fully as possible without item K-7/1/3 (Systematic instruction to workers in Methods and Quality by specialists) and this one item were reduced to a minimum, the output would average sixteen per cent below what it would average with this factor also functioning properly. The percentages shown in these columns were arrived at through a laborious process of arrangement in order of importance and of valuation which I cannot reproduce here. The valuations originally arrived at were rounded off at the nearest tenth of one per cent. We might have rounded off at the nearest whole per cent and made smaller "pretense of accuracy." However, adding 0.3 per cent to 0.7 per cent in the case of K 12, for instance, is a much larger relative addition than adding 0.3 per cent to the 9.7 per cent of U 19. Furthermore, to value K 6, K 11, K 12 at one per cent is to assign them the same importance as K 13, K 17, K 18, K 20 and even K 1, whereas our analysis and judgment required them to be valued differently.

The forty-seven waste factors together add to 225.4 per cent. This does not mean that were there the absolute minimum of all mechanism the waste would be 2.25 times the possible product (a manifest absurdity). The result at such a minimum is obtained by multiplying together the *complements* of these waste factors (obtained by subtracting each waste factor, expressed as a decimal, from unity). That product is 0.0925 or 9.25 per cent which, subtracted from unity or one hundred per cent, indicates a maximum possible waste of 90¾ per cent.

These waste factor valuations were scaled down proportionately so that their sum would be one hundred per cent. The preliminary scaling is shown in the next column. The final "assigned points" column shows these rounded off to the nearest tenth of one per cent.

Thus this show of fine accuracy is unavoidable if distinctions in relative importance are to be maintained. Finally, when we apply to these as basis, such percentages as eighty per cent for "good," sixty per cent for "fair" and so on, the two places of decimals are rather unavoidable.

APPENDIX D

OBSERVATIONS OF A PROMINENT EXECUTIVE IN REPLY TO THE ABOVE CRITICISM

The Report "Waste in Industry" is undoubtedly the result of an extremely thorough and careful analysis of the conditions found in the establishments taken as representative of the various trades investigated.

Whether or not the picture is overdrawn must, of course, depend on the particular examples chosen. Until we have a larger percentage of all industries represented, doubt will probably exist and give rise to argument as to the absolute truthfulness of the tabulated results, as applying to all industries considered collectively.

Such doubt, however, need not detract from the usefulness of the report as a basis of bettering the conditions in our industrial establishments.

I do not find anywhere a condition which could possibly be doubted as exisitng. The only doubt that might arise would come rather as to the degree in which the wastes outlined might exist in industry as a whole.

Every concern probably has its long suit. One may be exceptionally good on stores control, another on personnel, another on planning and so on, but I have yet to see any concern that can assay 100 per cent on all subjects and most concerns are probably well below such a figure.

We all recognize that management alone cannot prevent all wastes. Some are distinctly within the control of the workers themselves. No one can refute this statement. The management can set limits as to allowed wastages but the ability of individuals varies tremendously and such limits would of necessity be more liberal than absolutely necessary.

The temperament of the workers will assert itself more or less and be reflected in wastes of all kinds, such as waste of time on the job, waste of material, wastes due to the workers' desire for recreation, pleasure, etc., and to lack of full application while on the job.

It is a difficult matter to accurately set down the definite ratio of management responsibility to workers' responsibility.

The statement that management is responsible for seventy-five per cent and labor for twenty-five per cent may look like a rather cold statement of fact which cannot be backed up. Perhaps it cannot, in cold figures. But why worry about that? We all realize it is a divided responsibility and we must surely get some idea as to the ratio between management and labor in order to intelligently effect betterments.

Does any one criticize time study methods whereby we tabulate time in less than seconds? Most time study men work in hundredths of a minute or only three-fifths of a second.

This precision carries us to two places of decimal in discussing one short minute as applied to productive effort. Why should anyone criticize similar tactics in attempting an analysis of Wastes in Industry?

Whenever we attempt to separate a problem into a multitude of component parts we must of necessity endeavor to rate as accurately as possible each of these parts when considered separately.

Whenever we deal with more or less intangible things we must always expect a certain element of inaccuracy, but we would multiply, rather than reduce such percentage if we relaxed on our endeavor to rate our separate findings as accurately as possible.

We must always bear in mind that many things perfectly attainable, may cost more in money or effort than they are worth after we get them. The old law of diminishing returns is ever present. In business we cannot afford to ignore it and it is of course to be taken into account in using this report.

The time element is criticized in my opinion unjustly. It is inconceivable to me that anyone could possibly be so short-sighted as to feel that conditions as outlined could possibly be changed "overnight." None of our achievements worthy of mention have ever been brought about so easily. Our whole industrial progress has been slow. We must make errors upon errors and painstakingly and persistently correct them, over and over, before new thoughts, new methods and new standards will become accepted and adopted. It seems to me absolutely unnecessary to say it will take time. Every single thing we do takes time and every one knows it.

How much time depends on how energetically we prosecute our problems, but even here we will always be restricted by the ability of human beings to absorb, accept and put into practice new and improved understandings.

Let us be broad in our criticisms of this work. Let us see if the statements themselves are accurate as to their existence in industry rather than try to determine the degree in which they exist. Personally I doubt if many of us realize the extent to which they are present other than in a somewhat vague and indefinite way.

I, for one, believe that the report is accurate in its statement of sources of waste and I am not in a position to criticize it as to degree when applied to industry as a whole. How can any one do that without facts pertaining to all industries? Any conclusions drawn without facts are merely opinions, and opinions of a great majority of people in a position to estimate conditions with reasonable accuracy.

If the report is sound in its fundamental statements of fact regardless of the exact degree of accuracy, it should be taken seriously by industrial executives and be backed by our best efforts to improve conditions as rapidly and effectively as practical from an economic viewpoint.

LOCAL SECTIONS

WE have not received announcements of the plans for winter meetings of the New York, Philadelphia, New England and Chicago sections. The recently-organized Cleveland Section holds its first formal meeting Friday evening, Sept. 29, and the recently-organized Central New York Section holds its first formal meeting at Syracuse, Friday evening Oct. 13.

The Central New York Section is a testimony to the vision, energy and salesmanship of Percy S. Brown, of the Corona Typewriter Company. His problem was to take a territory in which there were but two or three members and secure enough new members to make the nucleus of a working section. A preliminary meeting was held at Syracuse on July 28. Three members of the Society (including the Managing Director from New York City) and about twenty non-members were present. A second meeting was held on August 11. The result is a section of some twenty members, most of whom have joined the Society since the meeting of July 28. The territory covered by the section is an area represented by a radius of about 100 miles from Syracuse as a center. It is the intention later to contract the area as Eastern, Western and Southern New York sections are organized. The constitution of the Central New York Section follows:

BY-LAWS OF THE CENTRAL NEW YORK SECTION OF THE TAYLOR SOCIETY

Name and Object

1. The name of the Society shall be the Central New York Section of the Taylor Society.

2. The objects of this Section are the same as those of the Taylor Society of which the Central New York Section is a part, which are primarily as follows:

> To secure an understanding and intelligent direction of the principles governing organized effort, for the accomplishment of industrial and other social purposes for the mutual benefit of:
>
> A. The Community
> B. Labor
> C. The Manager
> D. The Employer

Membership

1. Membership in the Central New York Section is limited to members of the Taylor Society in good standing as covered in Articles C-3 to C-9, inclusive, of the Taylor Society Constitution.

2. All members of the Taylor Society or representatives of sustaining member firms whose business lies within the territory covered by the Section are eligible to active membership in the Section.

3. Membership in the Section is consummated on the payment of the prescribed annual dues.

Dues

1. In addition to the regular dues paid to the Taylor Society there shall be Section dues of five dollars per individual member per annum, payable in advance.

2. Any member in arrears for dues for a longer period than twelve months may, at the discretion of the Executive Committee, be deprived of the right to vote or hold office and may be dropped from the roll of the Section.

Government and Officers

1. The regular officers shall comprise a Chairman, Vice-Chairman and Secretary-Treasurer. They shall continue in office until their successors are elected.

2. The officers shall be elected at the annual meeting by the voting membership for a term of one year.

3. It shall be the duty of the Chairman to appoint all Committees other than the Executive Committee.

4. The duties of the officers shall be those usually pertaining to their respective offices.

5. There shall be an Executive Committee composed of three members elected at the annual meeting, the retiring Chairman and all of the officers.

6. The Executive Committee shall be the administrative body of the Section. A majority of the members shall constitute a quorum at all Committee meetings.

7. At the first annual meeting four members shall be elected to the Executive Committee for a period of one year. Thereafter three members shall be elected each year.

8. Vacancies in any elective office shall be filled by the Executive Committee for the unexpired term.

9. All elections shall be by ballot and letter ballots shall be construed as conforming with all requirements.

Meetings

1. Meetings shall be held not less than six times and as many more times a year as the Executive Committee may deem advisable and at such time and place as they may select. Annual meetings shall be held in the month of October.

2. Inasmuch as the Taylor Society is educational in its nature, regular meetings shall be open to non-members upon invitation of members, it being the duty of the members to notify the Secretary not less than four days in advance as to the number they have invited, unless it is known that the meeting is to be an open one where a number of guests can be accommodated.

Publications

1. All papers read before the Central New York Section shall become the property of that Section unless publication rights are waived by the Section.

2. All papers read at the meeting of the Section shall be submitted to the Managing Director of the Taylor Society for publication in the Society Bulletin and, if publication is not desired, such papers shall be returned to the Section and published by the Section if desired, or returned to the author, the Section and Society waiving all publication rights.

3. The Secretary of the Section shall report briefly in writing to the Managing Director of the Taylor Society after each meeting, attaching to his report of the meeting the papers which may have been presented, and the discussion (if recorded).

Amendments

1. Amendments to these Bay-Laws may be made by submitting such amendments in writing at any regular meeting. Amendments shall then be submitted to the members by mail and not less than thirty days later may be voted on at a regular meeting. A majority vote in favor of the amendment will insure its adoption.

THE WORK OF THE TAYLOR SOCIETY

BEFORE the next number of the BULLETIN is printed the Society will have begun a new fiscal year. It is therefore time for members to appraise performance, consider plans for the future, and be ready for the business sessions of the annual meeting—November 23.

At that meeting will be rendered the customary annual reports of the various officers; but before the meeting members will have received an advance report, including plans for the future, now being prepared by the President on behalf of the Directors.

Operations during the past year have been not less difficult for the Taylor Society than for other professional societies. The peak of the depression for professional societies seems to have lagged behind the peak of the industrial depression some six or eight months; therefore the heaviest burden of the depression on professional societies has been during the current year. It has taken the form in practically all societies of reduced cash income and the consequent curtailment of planned operations. But the peak of the depression has been passed and the problem is now primarily one of plans for a larger work in the future.

The need of such work as is done by the Taylor Society is greater than at any time before or since the war, and the opportunity and obligation for larger service is at least proportionately greater.

In case the reader fails adequately to appreciate the greater need of such work, he is requested to read and ponder over the brief article on p. 206 entitled "A Syllabus for Thoughtful Executives."

The work of the Taylor Society is of two kinds: educational and service to members.

Educational Work

The results of educational effort are intangible and impossible of measurement except over long periods and then only in a broad way. Therefore no statistics can be compiled of the results of eleven years of such effort. But the Society feels certain that it has accomplished considerable of an educational nature relating to administration and management, and that the rate of accomplishment has increased during recent years.

The facilities of its educational effort are the national society meetings, the BULLETIN, local section meetings and the central office. The purpose is, through these facilities, to inspire the habit of *sound thinking* concerning problems of administration and management and the habit of *scientific approach* to the solution of every problem of management.

Meetings have been planned to afford consideration of problems of *current interest* and *fundamental importance* to industry. The programs have sought to avoid consideration on the one hand of petty details, devices and stunts, and on the other hand of ideals so vague as not to have any bearing on current policies and plans. Some sessions have been less valuable than others, but there has been voluntary testimony that many both major and minor executives have left these meetings with new inspiration and new ideas of value—of practical value because translatable into definite plans and action.

The BULLETINS have put on permanent record, for careful study, the most valuable papers of these meetings, and certain other papers of importance. On another page is a note containing foreign appraisal of the BULLETIN. Coincident with this writing, the manager of the New York office of a large English company came to the Taylor Society office with a letter from the London head office of his company, instructing him to "get in touch with the Taylor Society" and enter a subscription to the BULLETIN for an executive in the interior of India.

The local-section meetings, when more developed, are intended to have a local, intensive educational influence comparable to the more general influence of the national meetings.

From its office the Society is a center of educational influence through interviews with callers and through correspondence. The membership may not realize what a number of persons call at the office in the course of a week seeking information concerning the broad aspects of one or another administrative or managerial subject. Many letters of inquiry are received and answered; on another page of this issue is an editorial, "Producers and Non-Producers," which is a reply to a specific written inquiry.

Service to Members

During the past two years the Society has been endeavoring to develop a service of practical usefulness to its members—something more specific and definite than the educational work.

This has taken several minor forms, such as the specialized personnel service, but the major line of service of practical value is the consultation and information service. It had its start a year or more ago through casual inquiries on the part of several members, has increased gradually and promises to become a most valuable tangible product of society work.

By "consultation and information service" is not meant anything which has the nature of or competes with the professional service rendered by a research organization or an industrial engineer. The office of the Society makes no attempt to solve a member's problem, either through an analysis of and report on any situation, or through the formulation of a plan or the devising of a method. To attempt such a service would not be wise were there facilities available—which there are not. What is meant by "consultation and information" service may be indicated by three or four disguised actual cases.

1. Mr. A, the owner and manager of a plant, has conceived the idea of developing his management along certain specific lines, as a result of suggestions received from an article in the BULLETIN. He calls at the office of the Society and spends an hour—may be two or three—in general discussion of the idea with the Managing Director; he inquires what experience others have had along the same line, from what persons and firms he can get more detail information, who are dependable professional consultants if he should decide to engage one, and so on.

2. The general manager of a plant by letter asks for information relating to a specific problem, as is illustrated by the letter of thanks printed on p. 193 of this issue.

3. A minor executive has been instructed to investigate and report on the handling of stores in the plant with which he is connected. He calls at the office of the Society for advice how to start his investigation, what others have done, where he can see cases, what has been printed on the subject; and the conversation usually includes a general discussion of the basic principles of stores keeping.

4. An engineer from France (or Sweden or Japan or one of several other countries) calls with a letter of introduction from a foreign member. He has been sent by his firm or his government to investigate methods of management in the United States. He is given an explanation of the lines of development of management in the United States and what of significance to look for; an itinerary is prepared for him and introductions to representative firms and engineers.

5. An investigator is making a study of a particular phase of the management problem. He calls for suggestions regarding sources of information, and in the course of the call asks for criticism of his method of investigation and tentative conclusions.

The Future

Members are urged to suggest lines of activity for the future, and in preparing to do so, to consider whether the two lines of activity to be most highly developed should or should not continue to be: (1) general educational work concerning the fundamentals of wise administration and progressive management; (2) consultation and information service to members

A SYLLABUS FOR THOUGHTFUL EXECUTIVES

WITH respect to manufacturing costs—

1. The downward movement in wages seems to have been checked by a shortage caused by immigration policy and a redistribution of workers, and, although there will undoubtedly be further wage adjustments, it seems probable that wages will settle at a point considerably higher than before the war. The United States Steel Corporation's wage advance has not been the only one; witness the following report of the National Industrial Conference Board concerning increases and reductions of wages during recent months:

Month		*Reductions*	*Increases*	*Total Changes*
April	15–May 15	54	9	63
May	15–June 15	23	26	49
June	15–July 15	25	21	46
July	15–Aug. 15	7	8	15
Aug.	15–Sept. 15	4	119	123

2. This higher level of wages will be reflected in costs of many materials.

3. The elements of prime cost seem certain to remain high, relative to conditions before the war; as also will many elements of indirect cost.

II. With respect to the consuming market—

1. National policy and European conditions seem to be such as to retard a development of foreign commerce, and industry in the United States will have to depend chiefly upon the domestic market.

2. Signs do not point to the development of any ex-

traordinary demand on the part of consumers; higher wages to fewer workers amounts to no more than lesser wages to a greater number of workers; good crops at low prices and high costs will not give the agricultural section an extraordinary purchasing power.

3. Industry is equipped for a large production.

4. The competition between enterprises is certain to be keen.

III. With respect to administrative policy it appears that the administrative policy of an enterprise will be forced to take one or both of two forms—

1. Consolidation with competitors;

2. Refinements in management to give power in competition, these refinements in management being:

   a. Better general administrations; long-time policies, budgets, schedules and coordination of departments.

   b. Better selling methods.

   c. Better production methods, in order to offer lower prices than competitors and better service to customers.

REVIEWS

Production Engineering and Cost Keeping for Machine Shops. By William R. Basset and Johnson Heywood, McGraw-Hill Book Co., New York, 1922, pp. VII, 311.

The comprehensive scope of this book is indicated by the chapter headings: What Production Planning Does, Purchasing as a Tool of Production, Need for Systematic Stockkeeping, Engineering the Product, Tool Issue, Laying Out the Machines, The Central Control of Production, Controlling the Work in the Shop, Planning in the Jobbing Shop, The Fundamentals of Correct Time Study, Setting the Standard, Setting Piece Rates, Special Cases of Time Study and Rate Setting, Time Study on Automatic Machines, What a Cost System Can Do for You, The Fundamentals of Cost, Fixed Charges, Departmentalizing the Overhead Expense, Analyzing the Labor Costs, Accounting for Supplies, Getting the Overhead Into the Finished Product, Handling Abnormal Expense, Gathering the Final Costs, The Statement of Condition and the Operating Statement, What Does It Cost to Sell?, Graphic Methods of Control.

While the text relates almost exclusively to machine-shop practice, and largely to specialty shops producing a limited variety of products in relatively large quantities, the methods and practices described might be equally applicable with more or less modification in other than metal-working industries.

As is inevitable in any treatise on industrial management, and especially so in one dealing with machine-shop operations, the authors have accepted and built upon much of the doctrine and practices of scientific management developed by Taylor. Therefore it is surprising that Taylor is not mentioned among those to whom they acknowledge indebtedness.

It should not be assumed, however, that the authors have described, or presented as their own, the system developed by Taylor. The plan of organization, the methods for planning and control of production, and the methods of accounting here described, may be said to be a compromise between those of scientific management and ordinary practice. In the main they represent what Mr. H. P. Kendall has described as "systematized management," although in certain respects they approach one on more steps nearer the scientific management level.

In fact, the authors seem to criticize scientific management as too rigid because they believe it to be more rigid than it is. Witness Ch. VIII:

"The common idea, founded on the teaching of the early industrial engineers, is that a schedule of production, once drawn up, must be lived up to whether 'school keeps' or not. That idea offends the common sense of most managers. . . . Such planning is worse than useless. Better than that is the extreme opposite methods of handling production from hand to mouth by means of stock chasers, who with all their faults are at least in touch with the shop and in sympathy with its trials and troubles."

Taylor and his associates were unquestionably the earliest of early industrial engineer, and this may be taken as an implied criticism of Taylor methods. But the assumption concerning Taylor methods is contrary to fact; it shows a lack of familiarity with those methods and the literature concerning them; the authors have in this instance created but a straw man to shoot at.

Therefore while in general the book builds on the framework of scientific management, as is indicated by the chapter headings, the underlying treatment leans rather towards giving at least full value to "the extreme opposite methods" to those believed to be characteristic of scientific management.

Lack of thoroughness and precision is indicated by such circumstances as these: In the chapter on Analyzing Labor Costs the authors refer to keeping time in decimals of an hour rather than minutes, and show a home-made time clock dial so subdivided (twenty years ago found only in Taylor shops), but in the chapters treating time study the authors suggest the use only of stop watches reading in seconds. In the chapter on Tool Issue two illustrations are given of saving by tool-room control of high-speed steel at pre-war prices—a saving in one instance of $4,200 and in the other of $13,000. The prices of $5 and $6 per pound were used in the illustration. As a matter of fact before the war the best high-speed steel cost from $.60 (in quantity or specification) to $1.25 (proprietary brands in small lots), and during the war the highest price paid by a shop with which the reviewer is connected was only $2.64 (in 1917-18). Such savings as are indicated by the illustration are possible, but the argument is weakened by a price per pound which machine-shop executives will question.

The cost-keeping practice described is fundamentally sound in most respects. It would be rendered much more useful, however, if a suitable classification of activities, expense, etc., were included. While in most respects similar to the Taylor methods, it seems unnecessarily complicated in the matter of distribution of indirect expense, and involves considerable work which might be avoided with the same or greater accuracy in the final result. As may also be said of the system of planning and controlling production, and indeed of the methods of making time studies, that there appears to be a certain amount of duplication of work which to some readers may not seem consistent with the authors' warnings against oversystematizing.

The authors point out certain truths which it would be well for all managers to "read, mark, learn and inwardly digest;" some of which if not new are better stated than heretofore.

Recently there has cropped up seemingly a desire to force uniformity in costs of products, whether made in busy times under favorable conditions or in dull times. With reference to this the authors say:

"Incorrect Methods of Pricing.—It is essential that the cost figures reflect the actual operations of the business. An estimate is a different thing and is ordinarily dictated by outside conditions over which the manufacturer has no control.

"Confusing estimates with costs has led to many entirely inaccurate methods of pricing materials. In order to keep the costs and the stores inventory 100 per cent correct, some method of pricing must be adopted which will make the total of the physical inventory check dollars-and-cents-wise with the inventory record upon which the inventory records in the main books of accounting depend; providing, of course, that there have been no actual physical shrinkages."

They also wisely point out: "Unless the cost system ties in frequently with the general books of account we have no check